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**Airpower in Your Hip Pocket: Under What
Conditions Should an Operational Commander
Constitute an Air Reserve?**

**A Monograph
by**

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Using theory, history, and contemporary analysis, the study derives a series of hypotheses about the conditions which suggest the utility for an operational level commander to constitute an air reserve. Then comparing the different conditions against several operational criteria, the monograph tests the hypotheses to answer the research question.

The study concludes that an operational commander should consider constitution of operational air reserves during ambiguous air situations, when he is on the operational defense, or when outnumbered or outclassed by enemy air forces. Current Department of Defense (DOD) and United States Air Force (USAF) doctrine is deficient in the area of air reserves. The USAF in the future could fight in any of the situations mentioned above. Therefore, the need for further study in this area is clear.

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ABSTRACT

Airpower in Your Hip Pocket -- Under What Conditions Should An Operational Commander Constitute An Air Reserve? by Maj. Kimble D. Stohry, USAF, 99 pages.

This monograph examines a concept considered an abomination to some airmen - operational air reserves. The study is exploratory in nature: searching applicable theory, historical examples, and contemporary developments for insights on air reserves.

It appears likely that some currently forward deployed military forces will return to the United States to form a strategic reserve. These strategic reserve forces may have to deploy to and fight in a future theater of war. There the theater commander may elect to commit all of these forces or retain a portion of them as a theater reserve.

Ground theorists have written extensively on the utility of reserves. Air theorists have written little. Two historical examples of operational air reserves studied in this monograph are the Battle of Britain (1940) and Soviet air supremacy operations in the Kuban (1943). In contemporary developments both the Israelis (1967) and the Egyptians (1973) constituted air reserves.

Using theory, history, and contemporary analysis, the study derives a series of hypotheses about the conditions which suggest the utility for an operational level commander to constitute an air reserve. Then comparing the different conditions against several operational criteria, the monograph tests the hypotheses to answer the research question.

The study concludes that an operational commander should consider constitution of operational air reserves during ambiguous air situations, when he is on the operational defense, or when outnumbered or outclassed by enemy air forces. Current Department of Defense (DOD) and United States Air Force (USAF) doctrine is deficient in the area of air reserves. The USAF in the future could fight in any of the situations mentioned above. Therefore, the need for further study in this area is clear.

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I. INTRODUCTION

The concept of constituting an air reserve is foreign to most air forces.¹ In the United States Air Force (USAF), some officers feel that keeping any airpower in reserve is an abomination.² Although reserves are common to the planning and execution of ground operations, there is a lack of literature on air reserves. Interestingly, in his book The Air Campaign, Colonel John A. Warden hypothesizes that air reserves are important.³ In an era of declining defense budgets, threatened force reductions, and Congressional calls to bring forward deployed forces home to the United States, it is therefore wise to examine critically the concept of establishing air reserves at the operational level.⁴

For discussion's sake, imagine that the Congress calls for forward deployed forces to return to the United States. Forward deployed air and ground forces brought home to a "strategic reserve" in the U.S. could quite possibly require rapid reintroduction into a future theater of war.⁵ General (Gen.) Colin Powell, current Chairman of the Joint Chiefs of Staff (CJCS), recently called for "an air force that can clear the skies the moment such a task is called for."⁶ The theater of war commander receiving an air force to "clear the skies" can either place it under a theater of operations commander or establish a theater of war reserve (with part or all of it). The receiving theater of operations commander may

also opt to place the force he receives in reserve (part or whole) or place it under appropriate air commanders.⁷ [Appendix A contains definitions of several terms used but not explained in the monograph.]

An operational reserve is officially defined as "an emergency reserve of men or material established for the support of a specific operation."⁸ This differs from a strategic reserve which is an external reinforcing force that can be deployed to any region and committed to a specific command for a mission decided by the receiving commander.⁹ For this monograph an operational reserve is considered a constituted reserve in either a theater of war or a theater of operations.

Air reserves are undefined in JCS Pub 1. For this monograph an operational air reserve is defined as:

That portion of an air force, under the operational control of a theater commander (theater of war or theater of operations), which is held out of combat in anticipation of later use to influence the outcome of a specific operation or campaign.¹⁰

These definitions establish the basis for examination of the methodology of this monograph. The monograph addresses the question 'Under what conditions should an operational commander constitute an air reserve?' The study seeks to answer the research question through examination of theory, historical examples, and contemporary analysis. The first section examines and compares theories of ground and air warfare for insights into operational reserves, reviewing in the process six

theorists from the classical period to the present. The next section studies two primary historical examples where air reserves were employed: the Battle of Britain (1940) and Soviet air supremacy operations over the Kuban (1943). Next, the study examines contemporary developments to draw attention to significant events affecting air power and the possible future use of air reserves. At the end of the three sections (theory, history, and contemporary analysis) hypotheses are formulated concerning the use of air reserves at the operational level. After analysis the sum hypotheses are then tested against several operational criteria to answer the research question. The conclusion is then compared against current Department of Defense (DOD) and United States Air Force (USAF) doctrine to address implications of the study.

This monograph is exploratory in nature; its purpose is to shed light on the subject. The first flicker of light comes from an examination of theory.

II. THEORY

The purpose of military theory is to guide the thinking and intellectual development of future commanders.¹¹ Theory divides the study of war into manageable portions in order to teach war from books.¹² There is always a conflict between this finite theory and the limitless practice of war.¹³ Nevertheless, examination of the theory of ground and air operations helps

illuminate the critical elements in warfare.

First the study examines the writings of ground warfare theorists Carl von Clausewitz and Baron de Jomini. Next it searches the writings of air warfare theorists Giulio Douhet, William (Billy) Mitchell, Alexander de Seversky, and John Warden for comments on reserves. An hypothesis based on the examination of theory concludes this section.

Ground warfare theorists Clausewitz and Jomini both wrote extensively on reserves. Since Clausewitz and Jomini did not use the term 'operational', one does not find 'operational reserves' mentioned in their works. Clausewitz used the term 'strategy' while Jomini used both 'strategy and grand tactics' to describe what we now accept as operational art.¹⁴ [The term 'operational' will be used in this context when referring to their thoughts.] Clausewitz said, 'tactics teaches the use of armed forces in the engagement; strategy, the use of engagements for the object of the war.'¹⁵ Jomini described 'grand tactics' as 'the art of well combining and well conducting battles.'¹⁶ U.S. Army Field Manual (FM) 100-5's contemporary description of operational art brings these two classical descriptions together today: 'the employment of military forces to attain strategic goals through the design, organization and execution of campaigns and major operations.'¹⁷

One of Clausewitz's concerns in this area was that a commander would 'husband the reserve and not release it

when needed.¹⁸ Reserves, he felt, should be employed at the decisive stage in the battle. If not used, they are 'self-contradictory.'¹⁹ Thus, if reserves were too far away (time/distance) to reach and influence the battle, they were useless. At the operational level, the commander should have a definite purpose in mind for employment of his reserve. 'Its value will decrease the less specific its intended employment.'²⁰ The commander's vision for the use of the reserve must conform with the campaign plan.²¹ With that in mind, Clausewitz visualized two distinct purposes for employment of reserves: prolonging or renewing the action, and countering unforeseen threats.²² An unforeseen threat can menace the commander anytime the enemy situation is too ambiguous to judge properly. When the reserve is committed, it should be employed in mass at the decisive point.²³

Clausewitz also theorized that offense and defense are closely interrelated.²⁴ 'Every method of defense leads to a method of attack.'²⁵ He postulated that every offense can transition to the defense.²⁶ This interrelationship of offense and defense can greatly affect the use of reserves. A strong reserve introduced at the decisive phase of the battle can change the defensive phase into an offensive one, and vice versa for the other side.²⁷ Reserves committed in the pursuit phase of an offensive can destroy a shattered defender.²⁸ Likewise, reserves committed in a defensive situation can buy time

to launch a counterattack. Reserves can also constitute the counterattack force.²⁹ One may now examine what Napoleon's other chronicler, Jomini, had to say about reserves.

Jomini claimed that Napoleon organized reserves for all his campaigns.³⁰ Jomini prescribed reserves at all levels of war in both offensive and defensive situations.³¹ At the operational level he believed in reserves for each army and army corps.³² Jomini had a preference for offensive operations; he called the defensive an "offensive-defensive."³³ He also believed that a reserve used either defensively or offensively offered advantages to the commander.³⁴

In the offense Jomini thought that reserves should weight the main effort. This weighting could be of two kinds: reserve units in line ready for combat, or those units behind the line ready to make up for losses in front line units (replacements).³⁵ In the defense Jomini said, "A strong and well conceived reserve ready to counter-attack when least expected is the means to seize this initiative."³⁶ The timing of the counterattack is critical. It should occur suddenly, just when the attacker thinks he's won the victory.³⁷ Also, Jomini thought that the placement of operational reserves was the key to their employment. Reserves had to get to the place of their intended employment in time to influence the action.³⁸

This brief survey of Clausewitz's and Jomini's

writings demonstrates that they recognized the utility of strong reserves and had certain common prescriptions for their use. Reserves could aid commanders in both the offense and defense. Placement of reserves was critical. The reserves had to be able to get to the battle in time to influence it.³⁹ Employment of reserves should be in mass at the decisive time and place of the battle.

Now we should consider whether these prescriptions follow in the theory of air warfare. Transitioning from Napoleonic era theory to air power theory involves a leap of about 100 years, the cycle of one Industrial Revolution, and the genesis of operational art.⁴⁰ Airpower offered an exciting alternative to traditional Napoleonic thinking on war.

Airpower is simply 'the ability to do something in the air.'⁴¹ Early air warfare theorists favored the offensive nature of airpower and neglected the concept of reserves in their writings. Early air theorists assumed that this new arm could provide 'quick, clean, mechanical, and impersonal solutions' to war.⁴² Douhet described the airplane as 'an offensive weapon par excellence.'⁴³ Billy Mitchell's early writings gave much attention to air forces' cooperating with ground forces, including the use of air reserves.⁴⁴ In later years, as he became more of a zealous advocate for a separate air force, these concepts became less evident.⁴⁵ Alexander de Seversky recognized the utility of air power in offensive and defensive roles.

favoring the offensive. He wrote nothing though on air reserves.⁴⁶ Recently, Col. John Warden devoted an entire chapter in his book The Air Campaign to air reserves.⁴⁷ One may now study these air theorists in detail.

Douhet did not believe in air reserves.⁴⁸ His writings show great imagination and vision even though many considered him an extremist.⁴⁹ Aircraft, to him, were instruments of pure offensive power. Douhet did not postulate an effective defensive counter to them.⁵⁰ For this reason he advocated a massive aerial first strike at the inception of the war.⁵¹ For example, he favored destroying airplanes at their home bases rather than shooting them down in aerial combat.⁵² Knocking out enemy airpower in this first strike and then following it up with attacks on military "vital centers" and undefendable population areas would achieve "command of the air." This is defined by Douhet as "being in a position to prevent the enemy from flying while retaining the ability to fly oneself."⁵³ This, in his view, would ensure victory.⁵⁴ Douhet understood the value of the defensive in ground warfare, but ignored its potential in air warfare.⁵⁵ Let us now compare his views with those of Billy Mitchell.

Billy Mitchell's early writings stressed air cooperation with ground forces in "facilitating the advance."⁵⁶ A decorated combat pilot in World War I, Mitchell's use of massed airpower to achieve air superiority at St. Mihiel delighted General Pershing.⁵⁷

Mitchell was more familiar with the tactical problems of airpower than was Douhet.⁵⁹ He understood the pertinent lessons of World War I, having a keen insight for implications to the next global conflict.⁶⁰

Mitchell considered airpower 'the strategic reserve of the commander of a great army.'⁶¹ He knew airpower could arrive at the decisive point of battle much more quickly than the two and one half mile per hour infantry reserve of World War I.⁶²

Mitchell also noted, in Our Air Force, the use of the French Air Division as an 'air reserve of the whole French Air Force.' He noted: 'whenever a decision was being called for on the front, there would be found the French Air Division.'⁶³ This implies that the French Air Division helped the French Army weight its main efforts. Mitchell's early writings also stressed the need for a balanced aviation force of bomber, observation, attack and pursuit aircraft.⁶⁴

Mitchell understood the interrelationship of offense and defense and postulated the use of air power in both roles. Though he is famous for his advocacy of strategic bombardment and the call for a separate air force, Mitchell's writings show a keen understanding of tactical ground and air warfare.⁶⁵

Mitchell's operations order for the St. Mihiel offensive gave pursuit aviation the specific mission of machinegunning 'the enemy's reserves which are in a

formation for counterattack."⁶⁵ Though not tried at St. Mihiel, Mitchell also wrote on the capability of airpower to cover a friendly retreat. Pursuit aviation, he wrote, would keep air superiority over the defending ground force and shield its movements from observation.⁶⁶ This showed his thoughts on air power aiding ground troops in the defensive. Thus Mitchell believed airpower, as a reserve of the overall commander of that day, could be employed offensively or defensively. Now one may examine the writings of Alexander de Seversky.

Alexander de Seversky understood the relationship of offense and defense, but neglected air reserves in his writings. He said: "The offense and defense represent opposite sides of the same coin - aerospace battle."⁶⁷ De Seversky described the race between offensive and defensive weapons in airpower in his book Victory Through Airpower. He noted that pursuit aviation, essentially defensive, ruled the skies in World War I. After the war the bomber's capability seemed superior to the fighter's, which gave way to Douhet's thesis.⁶⁸ During World War II, fighters seriously hampered undefended bombers. The pendulum had swung again.⁶⁹

De Seversky understood the need for close cooperation between air and ground forces.⁷⁰ Tactical airpower, he said, has the advantage of longer range and greater payload and accuracy than ordinary artillery.⁷¹ He favored the offensive use of airpower, but wrote extensively on its limits in offensive and defensive roles.⁷² De Seversky,

for reasons unknown to the author, never mentioned air reserves in his writings. Now one may examine a contemporary airman's theory on the use of reserves.

As mentioned earlier, John A. Warden, a Colonel in the USAF, feels air reserves have been ignored and are, in fact, quite important. His chapter on reserves in The Air Campaign emphasizes the value of reserves in weighting either the offense or defense.⁷³ He also explains why reserves are not normally thought of in air operations: fliers fear that "a sortie not flown is a sortie forever lost."⁷⁴ To counter that notion he cites examples in the Battle of Britain where that was not the case. Here Air Marshal Dowding used air reserves to deny the Luftwaffe air superiority.⁷⁵ Warden argues that the use of air reserves contributed significantly to the British victory. In his book Warden presents a balanced review on the theory of reserves and lists a few principles for the concept:⁷⁶

- Reserves may help better the odds.
- The shock value of reserves is valuable.
- Since war efforts come in surges, air reserves can be a viable concept.

Warden's last principle deserves more attention. He says that "Lulls between enemy offensive or defensive surges offer opportunities that can be exploited if force is available to do so."⁷⁷ If a theater commander wishes to concentrate the efforts of air and land power at a

given space and/or time, then the air sortie flown at that time is more important to him on that day than another.⁷⁸ Therefore, a reserve in being is needed to give the theater commander that flexibility.⁷⁹ Warden's fundamental consideration is that a commander should consider an air reserve 'if he expects to meet a numerically superior foe.'⁸⁰

Thus air and ground theory on reserves overlap somewhat. Air and ground theory visualize the use of operational reserves in both offensive and defensive roles. Clausewitz and Jomini wrote on the interrelationship of offense and defense and the employment of operational reserves in either situation. Mitchell understood the offensive and defensive roles of airpower and wrote on its capability as a reserve of the theater commander. Warden was the first airman in contemporary times to raise the issue of a theater-level air reserve drawing on classical ground warfare theory. TABLE I contains several hypotheses based on a review of theory.

TABLE I HYPOTHESES BASED ON THEORY

- * Offense and defense are interrelated.
- * Operational reserves (air or ground) can:
 - Be employed offensively or defensively to reinforce success or deny the enemy success and regain the initiative (usually by counterattack).
 - Counter unforeseen threats in ambiguous situations.

- They are especially valuable when you are outnumbered.
- * Operational reserves are committed by the theater commander. (Theater of War or Theater of Operations.)
- They should be committed in mass (not piecemeal).
- The principles of mass and surprise apply.

* * *

Having examined the concept of the use of reserves in pure theory, one can examine historical experience for its insights into the subject of air reserves.

III. HISTORY

History gives the uninitiated a vicarious experience of the realities of war which can build on the theoretical base established for air reserves.²¹ The monograph now examines two primary historical examples of operational air reserves. First it studies the 1940 Battle of Britain. This campaign provides the first documented use of air reserves in modern air battle. The second example is the 1943 Soviet air superiority operation in the Kuban. This operation helped turn the air war on the Eastern Front in favor of the Soviets by using strategic air reserves to weight main operational efforts.²² It also molded their doctrine for subsequent 'air offensives', all using air reserves. The purpose of examining these campaigns is to refine through vicarious experience the theoretical hypotheses developed in the previous section.

The Battle of Britain is an important episode in the annals of air warfare. It offered air theorists the first large scale historical test of a purely air battle.⁸³ Advocates of both the offensive and defensive views of airpower use the battle to justify their cases.⁸⁴ In the summer of 1940 Britain was strategically on the defense in the European theater of war. Her soldiers escaped from Dunkirk, but their equipment was lost and their morale was shattered. Operationally, in and over the Channel theater of operations, only the Royal Air Force and Royal Navy could keep the Germans from getting to the invasion beaches.⁸⁵ Germany had just rolled over Poland, Denmark, and Norway, and won the Battle of France. Strategically and operationally, Hitler was still on the offensive.⁸⁶

In this setting, Britain could win by just surviving.⁸⁷ If the RAF held off the Luftwaffe, it won operationally and strategically. Germany had to win air superiority over the Channel and southeastern England in order to invade the British Isles.⁸⁸ That meant defeating the RAF first, before decisively engaging the Royal Navy. Without air superiority, the invasion would fail operationally and Germany would suffer its first strategic defeat.⁸⁹ [Appendix B contains a map of the theater of operations, chain of command diagrams for each side, as well as comparative air orders of battle.] Germany's head airmen in the battle was Field Marshal Herman Goering.

Goering, a WW I Luftwaffe fighter pilot, firmly

believed in Douhet's offensive doctrine of air power.⁸⁰ He had operational air victories in Poland, Norway, Holland, and France to bolster this opinion.⁸¹ Poland and the Netherlands fell after Luftwaffe bombardments of Warsaw and Rotterdam.⁸² The RAF, however, had not been asleep while the Luftwaffe won the skies over continental Europe. They wisely dispersed their aircraft at different locations and used camouflage techniques to hide them.⁸³ By these techniques they avoided the risk of losing their air force in a surprise German attack.⁸⁴ The RAF Fighter Command had at its helm a quiet disbeliever in Douhet's theory, Air Marshal Hugh Dowding.⁸⁵

Dowding's plan for the defense of Britain hinged on geography and knowledge of the technological capabilities of each opposing force. [see map in Appendix B] Counting the fighters the RAF held in squadron reserve, the ratio was 1.33 to 1 in the RAF's favor.⁸⁶ Excluding the squadron reserves, the Luftwaffe outnumbered the RAF in operational fighters by 1.08 to 1. Dowding reasoned that No. 11 group, commanded by Air Vice Marshal Park in the southeast of England, would "bear the brunt of the fighting."⁸⁷ This was because the combat radius of French based ME-109s would allow them only short forays into Air Vice Marshal Leigh-Mallory's No. 12 Group north of London.⁸⁸ Dowding's placement of forces accounted for multiple Luftwaffe courses of action. The enemy air situation was ambiguous. Luftwaffe bombers could hit operational and industrial

targets in separate group sectors or concentrate for a mass blow with fighters against London.⁹⁹ Numbers 10, 12, and 13 Groups could aid 11 Group operationally to protect London if directed. Until then they guarded their sectors against possible attacks. Additionally, 200 fighters were kept in 'squadron reserve' ready for issue if needed.¹⁰⁰ Dowding's command and control system for air defense was built around anti-aircraft artillery (AAA), fighters, ground observers, radar, and group and sector command posts.

The key units during the battle were Group and Sector Command posts. Fighter Command did not play a very active role, although it did have occasion to intervene from time to time when Number 11 Group became saturated and had launched all its aircraft. Then it would call upon one of the other groups to send reinforcement [author's emphasis] into the Number 11 Group area.¹⁰¹

This was, in my opinion, authority to commit the air reserve. Later in the battle, Dowding, the strategic-operational air commander, allowed Park (Commander of 11 Group) to make this call by himself. Under these provisions Park, an operational commander, could direct Leigh-Mallory (in reserve) to launch 12 Group fighters in support of him.¹⁰² This was not, however. Dowding's only air reserve.

In the early phase of the Battle of Britain, Dowding shrewdly rotated battle-weary squadrons from the 11 and 12 Group sectors to groups in less combat-intensive areas.¹⁰³ There they could rest, train, and avoid being bled to

death by constant attrition.¹⁰⁴ By September 1940, heavy losses forced Dowding to abandon this technique. He then reclassified squadrons as "A, B, or C" types. "A" squadrons fought as units in the intense combat areas of the southeast (mostly 11 Group).¹⁰⁵ "B" squadrons were manned and flew as units in No's 10 and 12 Groups. They would relieve units in 11 Group on order.¹⁰⁶ "C" squadrons, out of intense action, trained individual replacement pilots (not units) for posting to "A" squadrons.¹⁰⁷ The Germans were aware of this strategy and attempted to counter it.¹⁰⁸

Dowding's dispersal strategy encouraged the Luftwaffe to attempt to force a decisive air battle.¹⁰⁹ Fortunately for the British, Ultra intercepts kept Dowding abreast of these German moves.¹¹⁰ He knew that a large German air offensive would be conducted on 15 September.

Consequently, Dowding used his strategic reserve to bring every fighter unit in Park's and Leigh-Mallory's sector up to strength. He also put fewer than the usual number of fighters in the air on 14 September, leading the Germans to think they were winning, and also giving Fighter Command a chance to prepare for the next day's action.¹¹¹

Luftwaffe intelligence reports were then reporting that the RAF was down to it's "last 50 Spitfires." Believing this, the Luftwaffe launched a mass raid on London 15 September 1940.¹¹² Tactically, Leigh-Mallory's aircraft were massing for attacks in "big wing" formations of multi-squadron size.¹¹³ The Luftwaffe lost approximate-

ly 50 planes that day, but more importantly they saw British fighters in masses of 200-300 aircraft over London.¹¹⁴

RAF air reserves significantly affected this decisive phase of the Battle of Britain.¹¹⁵ The British did not commit their air reserve piecemeal. Operationally, they shifted forces to the decisive point and held none in reserve.¹¹⁶ Churchill, who visited Park at his headquarters that day, asked Park: 'What other reserve have we?' Park replied, 'There are none.'¹¹⁷

Poor weather precluded further Luftwaffe attacks for the next few days.¹¹⁸ Hitler cancelled the invasion on 17 September 1940 and subsequently focused on invading Russia.¹¹⁹ The Luftwaffe continued insignificant raids on Britain throughout that winter, but the worst was over.¹²⁰ 'RAF Fighter Command did not gain command of the sky,' but they survived.¹²¹ [Aircraft losses for both sides are located in Appendix B.] By surviving, they achieved an operational and strategic victory in winning the Battle of Britain.¹²² One may turn now to examine Soviet air supremacy operations in the Kuban (1943).

In June 1941, the Soviet Air Force (SAF) faced the combat-tested Luftwaffe on the Eastern front. In the opening round, the Luftwaffe destroyed 2000 Russian aircraft (22-24 June 1941).¹²³ After such hard-fought experience that summer, the SAF determined to reorganize its command and staff elements.¹²⁴ During this reorganization, the Soviet Supreme High Command (Stavka)

created special reserve air corps and independent air divisions. [They will be referred to as Stavka air reserves from now on.] These Stavka air reserves were formed from existing aviation armies and other units.¹²⁵ They were tailored in organizational structure for great mobility and maneuverability.¹²⁶ Stavka air reserves were organized at the strategic level and employed at the operational level. The Supreme High Command allocated Stavka air reserves to frontal air armies for the duration of ground and air operations.¹²⁷ Stavka air reserves then employed operationally under the control of the Stavka aviation representative. Stavka aviation representatives maintained contact with the General Staff and Air Force Staff. They worked at different levels of command, writing plans, apportioning air reserves arriving at the fronts, and monitoring execution of aviation missions.¹²⁸ I consider this use of air reserves as strategic - operational in nature. The Kuban experience provides a good example of this.¹²⁹

Attaining air supremacy in the Kuban (Spring-Summer 1943) gave the SAF its first valid test of the use of air reserves. Soviet writers call this type of operation an 'air offensive.'¹³⁰ Stavka air reserves were instrumental in achieving air supremacy in the Kuban air offensive.¹³¹ Nineteen Stavka air reserve corps were formed by April 1943 in the SAF.¹³² The Stavka air reserves reinforced the North Caucasus Front Air Force [Kuban] in April 1943

with 590 Stavka air reserve aircraft (1 Bomber Air Corps, 1 Fighter Air Corps, 1 Composite Air corps, and 1 Fighter Air Division). [Appendix C contains a map of the theater of operations, opposing forces command and control diagrams, and air orders of battle for the Kuban.] Stalin ordered Stavka representatives Marshal Novikov (air) and Marshal Zhukov (ground) to the Kuban on 18 April 1943.¹³³ Novikov then assumed leadership of and coordination responsibility for all aviation activities there. Novikov's activities in the Kuban were those of an operational air commander. The addition of the Stavka air reserve before the Kuban air offensive brought the correlation of forces up to 1.1 to 1 (in the Luftwaffe's favor).¹³⁴ The SAF had the advantage in fighters, the Luftwaffe in bombers. The Luftwaffe had more airbases than the SAF and they also were of higher quality than Soviet airbases.¹³⁵ Because of this situation, Novikov rightly judged that air superiority would be the key to the Kuban air offensive.

The air fighting over the Kuban was spirited with each side losing heavily.¹³⁶ Kozhevnikov describes the air encounters as the "largest of the entire war."¹³⁷ Initially the SAF flew only along their front lines to gain local air superiority. As their strength in numbers grew, (more Stavka air reserves arrived at the front) the SAF ventured deeper to strike offensively against German airfields in the Taman peninsula, the Crimea, and the

southern Ukraine.¹³⁸ Fresh Stavka air reserves introduced during operations in the Kuban increased the correlation of air forces to 1.8 to 1 in the SAF's favor.¹³⁹ The Luftwaffe then went over to the defensive periodically.¹⁴⁰ Reacting to these developments, the Luftwaffe reinforced the Kuban by transferring bombers from the Ukraine and regained the initiative for a short while by increased numbers; however, it failed to regain German air superiority.¹⁴¹ The SAF meanwhile kept up strikes against German airbases and recovered the initiative by early June.¹⁴² SAF mass employment of fighters forced the Luftwaffe to begin bombing only at night, which relieved the pressure against Soviet ground forces in the Kuban.¹⁴³ With air superiority gained by July 1943, the SAF began attacking targets deep in the German rear day and night.¹⁴⁴

German aerial domination of the Eastern Front slipped a notch at the Kuban.¹⁴⁵ The SAF used their Stavka air reserves, building up the correlation of forces (especially fighters) at critical points, to gain air superiority and continue their quest for strategic air supremacy on the Eastern Front in 1943.¹⁴⁶ As new air offensives were planned, Stavka air reserves were shifted to weight the main effort of those offensives.¹⁴⁷ The SAF used Stavka air reserves in the following air offensives in sequence after the Kuban:¹⁴⁸

Kursk
Belorussian Operation

Vistula-Oder Operation
Koenigsberg Operation
Berlin Operation

These examples are illustrative of the use of strategic air reserves to bolster operational level units by weighting main efforts. The desired impact of the allocation of Stavka air reserves was strategic in nature. Initial evidence does not indicate whether or not the Soviets kept air in reserve at the operational level.¹⁴⁹ However, SAF use of Stavka strategic air reserves was quite sophisticated by the end of WW II.

Both the RAF and SAF used air reserves successfully in World War II. The RAF used air reserves in the strategic and operational defensive of the Battle of Britain. The RAF could not afford to lose their total force by daily attrition. The air situation was ambiguous. The Luftwaffe could concentrate for a mass blow against London or hit a broad range of industrial and military targets. Dowding therefore kept a force in reserve to counter unforeseen threats. When the RAF did commit its air reserve, it did so in mass. As a result, the Luftwaffe soon ceased major air operations against Britain.

Later in W.W. II, the SAF used Stavka air reserves to weight their main operational efforts in an effort to wrest strategic air superiority from the Luftwaffe (Kuban, Kusk, etc.). These operational air offensives (offensive and defensive uses of airpower) won the strategic air

initiative from the Germans. When Novikov employed Stavka air reserves, he employed them in large formations. After Kursk, the SAF always employed Stavka air reserves in operational offensives. Table 2 contains hypotheses based on review of historical examples.

TABLE 2

Hypotheses Based Upon Historical Review

- * Airpower used as a reserve has offensive and defensive roles which are interrelated.
- * Air reserves in World War II have:
 - Been employed to reinforce success by weighting main efforts offensively and defensively. [Battle of Britain, Kuban]
 - Wrested initiative from the enemy when on the strategic and operational defensive. [Battle of Britain, Kuban]
 - Countered unforeseen threats in ambiguous air situations. [Battle of Britain]
 - Been committed in mass. [Battle of Britain, Kuban]

Next one should examine what has changed in air warfare since WW II and assess the impact of these changes on operational air reserves.

IV. Contemporary Analysis

Limited war has been the norm since WW II.¹⁵⁰ Airpower has been crucial in many of these wars.¹⁵¹ Since much has changed, it is useful to review significant events since WW II to see if the hypotheses based on

theory and history remain valid today. Jet aircraft were employed in World War II, but did not become common to air warfare until the Korean War (1950-1953).¹⁵² Anti-aircraft defenses likewise have improved dramatically since WW II. These two changes illustrate that technological superiority is an important factor in airpower today.

Three primary improvements in weapons systems have greatly influenced employment of airpower since WW II - large-scale adoption of jet fighter-bombers into air forces, the increased lethality of ground-based air defenses, and the advantages in capability offered by high technology. Though the Luftwaffe produced 1400 ME-262 fighters after 1943, they entered the war too late to make an operational impact.¹⁵³ Jets offered air forces the advantages of relatively high speed which could be used in the offense as long as dense defensive gun fire was avoided.¹⁵⁴ This speed advantage gave jets quite an advantage over piston-engined fighters and bombers. Jets could theoretically attack quickly and get away from the defensive fires of ground forces, fighters, or bombers. In practice though, jets were not immune to bullets. Communist AAA menaced United Nations pilots in Korea.¹⁵⁵ In Southeast Asia (SEA) 66% of U.S. aircraft losses are attributed to AAA. Surface to air missiles (SAMs), introduced in SEA, further complicated problems for airmen by "forcing aircraft into the teeth of the guns." SEA-era SAMs were high-altitude types which forced fighters to

ingress at lower altitudes where AAA was very effective.¹⁵⁶ Thus AAA and SAMs affected aircraft losses and thereby re-surfaced the question of a need for air reserves.

Air reserves in limited war have been smaller in scale than in WW II. At times, Third World countries have flown their air forces out of harm's way to keep them from being destroyed - a strategic reserve kept in a sanctuary.¹⁵⁷ In 1967 the Israeli Air Force (IAF) kept a small air reserve while conducting a preemptive strike against the Egyptians. In 1973 the IAF used a "red line" concept to signal a point where her air force would cease offensive operations to avoid detrimental losses. This "red-line" appears to be simply an estimate of the minimum number of aircraft the IAF needed to be able to wrest the initiative from the enemy. Also in 1973 the Egyptian Air Force (EAF) placed a portion of its force in a strategic reserve inside hardened shelters for a short period. The Egyptians specifically chose to avoid air battle with the superior IAF.

By 1973, after the Yom Kippur War, the power of ground-based defenses (AAA, radar, and SAMs) plus fighters, posed a significant problem to high-speed jet air forces.¹⁵⁸ High technology weapons have significantly affected airpower and its application in limited wars since then. British use of the AIM-9L air-to-air missile in the Falklands War and Mujahideen use of Stinger SAMs in Afghanistan against the Soviet Air

Force are two prime examples of this.¹⁵⁹ These weapons caused both the Argentines and the Soviets heavy aircraft losses. Considering these changes in aerial warfare, one can now examine the use of air reserves since WW II.

From 1948 to the present the Middle East provided a unique combat laboratory for limited war. In the 1956 Suez Crisis, British and French airstrikes destroyed the biggest part of the Egyptian Air Force (EAF) on the ground in 24 hours. Even if the EAF had accepted air combat, it would have been outclassed by the jets of the British and French Air Forces. Russian and Czechoslovakian pilots flew some EAF planes out of the theater of operations to sanctuaries in Saudi Arabia and Syria.¹⁶⁰ This kept the EAF from losing its entire air force.

The IAF learned the lesson British and French jets taught the EAF in 1956.¹⁶¹ By June 1967, the IAF felt confident it could perform this type of pre-emptive first-strike mission. Arab air forces had not hardened their airbases and were still vulnerable to a surprise attack.¹⁶² When Israel felt threatened by Arab saber rattling her leader approved a pre-emptive strike. The IAF's first strike hit hard. Within three hours of surge air operations, the IAF "had gained complete superiority in the air on all fronts."¹⁶³ It is interesting to note the risk the IAF took in this "Pearl Harbor" of the EAF:

In 1967 the ominous threat from the Russo-Arab Alliance, and the passivity of the West, favored Israel to accept a very dangerous gamble: less

than one squadron of IAF fighters was kept in reserve [author's emphasis] and all others were committed to an all out first strike which could have failed.¹⁶⁴

Though only a portion of one squadron, this was an operational (or perhaps strategic) air reserve for the IAF.¹⁶⁵ The air situation was ambiguous. The Egyptian, Iraqi, and Syrian air forces each had TU-16 and Il-28 bombers with the range to threaten Israel's vital centers.¹⁶⁶ The Arabs could launch a surprise attack against Israel at any time. The IAF reasoned that an unforeseen disaster could occur to their fighter bomber waves executing the pre-emptive first strike against Egyptian airbases and bombers. This would leave Israel's key installations and population centers unprotected from undestroyed Arab bombers. Therefore, they reasoned it was appropriate to retain a reserve of fighters to protect Israel.¹⁶⁷ The IAF operational air reserve resided in a special underground hardened airbase.¹⁶⁸

After two Pearl Harbors (1956 and 1967), the EAF began its own airbase hardening program.¹⁶⁹ It also started to improve its air defenses with newer Soviet SAM's and AAA.¹⁷⁰ The IAF capitalized on initial Egyptian coordination problems with the different parts of their integrated air defense system (IADS) during the War of Attrition.¹⁷¹ During this time the EAF maintained a defensive mindset.¹⁷² As coordination improved, the

Egyptian defenses became a formidable system for the IAF to counter.¹⁷³

The EAF made one surprise strike in the Sinai at the beginning of the war on October 6, 1973.¹⁷⁴ Following this they retired into "strategic reserve" inside hardened shelters, hoping the Egyptian IADS alone would wear down the IAF.¹⁷⁵ Since they had hardened airbases and an IADS in this war, they did not have to fly their air force to sanctuaries to preserve it.¹⁷⁶ The EAF finally accepted battle in mass over the Suez Canal to destroy key bridges used for the 18 October Israeli counterattack.¹⁷⁷ The IAF dealt the EAF another thrashing in this battle.¹⁷⁸

IAF losses to SAMs in the previous War of Attrition had taught them the increased defensive power of an IADS.¹⁷⁹ The IAF assumed that at the outbreak of any future conflict, it would have the time to mount a pre-emptive suppression of enemy air defenses (SEAD) operation against Arab IADS.¹⁸⁰ After suppressing enemy air defenses, the IAF would give more attention to close air support (CAS) and interdiction missions.¹⁸¹ Pre-emptive strikes were denied to the IAF for political reasons in the Yom Kippur War.¹⁸² When Syrian and Egyptian ground gains forced ground commanders to call for heavy doses of CAS, the IAF responded, but without conducting the SEAD operations they desired.¹⁸³ The IAF suffered heavy losses accepting this risk, but did thwart the Syrian ground advance in the Golan Heights.¹⁸⁴

The IAF won the air war, but took about twice as many losses compared to 1967.¹⁸⁵ AAA and SAMs claimed most of the victory credits against the IAF. [Appendix D contains comparative air orders of battle in the 1967 War and the Yom Kippur War.] A concept that arises out of these events is that of the 'red-line'.

In the Yom Kippur War the IAF used a red line as an indicator of a point that they could not cross in aircraft losses without taking unacceptable risk.¹⁸⁶ For example, if aircraft losses went above a certain red-line, then Israel would not have enough aircraft to wrest operational initiative from the Arabs. This concept seems to indicate a type of notional air reserve. As mentioned earlier, because of Syrian gains in the Golan, the IAF hastened A-4 attacks into the Golan without a SEAD operation because they needed to stop the Syrian armored operation before the Syrians crossed the Jordan River.¹⁸⁷ As aircraft losses grew here, the IAF approached the red line. Military staffs briefed the red line to the Israeli chief of staff and politicians each day.¹⁸⁸ The IAF at one point stopped bombing the Egyptian Suez Canal bridges because aircraft losses were dangerously close to the red line.¹⁸⁹ When the Syrian ground forces were stopped in the Golan, the operational risk diminished. Then the IAF resumed offensive operations on the Sinai front more in line with it's doctrine - SEAD first, then CAS and interdiction.

It appears from the above survey that the use of air reserves in limited war is less prevalent than in total war. Airpower has been important, but air reserves have been few in number and use. After W.W. II jet aircraft had an initial speed advantage over ground-based air defenses. The IAF first strike against Arab air forces in 1967 seemed to validate Douhet's command of the air theory. Even with a pre-emptive first strike, the Israelis formed a small air reserve to protect against possible Egyptian bomber attacks. Subsequently, Arab air forces formed strategic air reserves by flying them away from the action to sanctuaries. North Korean, Chinese, and North Vietnamese air forces did the same in Korea and SEA by flying their jets to Chinese sanctuaries. In SEA defensive systems (SAMs and AAA) forced airpower to take higher losses to accomplish the mission. Surface defenses likewise caused the IAF heavy losses in the Yom Kippur War. Israel used the concept of a 'red-line' in 1973 to make operational decisions and avoid detrimental airpower combat losses. The EAF, after a surprise first strike on Israel, placed its aircraft in reserve temporarily until its homeland was later threatened by Israeli ground counterattack. Technological improvements have aided offensive and defensive systems since then. Those forces who fail to keep up technologically have lost [Argentines, Soviets in Afghanistan]. Table 3 contains hypotheses based on review of contemporary examples.

TABLE 3
HYPOTHESES BASED ON CONTEMPORARY REVIEW¹⁹⁰

- * Small air reserves have been constituted in limited war to counter unforeseen threats in ambiguous air situations:
 - When outnumbered by the enemy.
 - When outclassed by the enemy.
- * Technological superiority in limited war is a combat multiplier which influences the question of air reserves.

* * *

V. Synthesis

It is first necessary to synthesize the hypotheses derived from theory, history, and contemporary developments before comparing that product against operational criteria for analysis. This is required because conditions vary between examples examined in theory, history, and the contemporary period. For example, the theory on air reserves examined in this monograph, in context, applies only to total war scenarios. Also, the historical examples cited (Battle of Britain and SADF operations in the Kuban) are from WW II - a total war. In contemporary developments though, in both cases where air reserves were constituted (IAF in 1967 and EAF in 1973), the wars were very limited in scope and duration. Therefore one must be careful to align theory, history, and contemporary events together without making sweeping generalizations.

There appear to be four situations where air reserves could be useful to an operational commander: when the air situation is ambiguous, when on the operational defense, when outnumbered, or when outclassed in the areas of readiness, training, or technology. The more ambiguous the air situation, the more need to constitute an air reserve. Theoretically this will help the commander counter unforseen threats. Historically, Dowding did this in the Battle of Britain by his placement of reserves into the northern groups out of the range of Luftwaffe. These forces were able, however, to respond to attacks on London. In 1967 the Israelis kept a small reserve to counter the unforseen threat of disaster to their pre-emptive strike force.

The next situation concerns the commander who is on the strategic and operational defense. The longer the war in this case, the greater the need for air reserves. Theoretically, an air reserve will help him regain the initiative if employed properly. Historically, the use of air reserves in the Battle of Britain and the Kuban did just that. In both these cases the air war changed from a strategic defensive to a strategic offensive. In 1973 the Israelis used a red line concept to gauge decisions on when to cease offensive air operations. This gave them the flexibility to retain an air force that would be large enough to regain the initiative while on the strategic and operational defensive.

When air forces are outnumbered, an air reserve can be useful. The greater the numerical inferiority, then the greater the need for air reserves. Theoretically, this reserve will help deny success to the enemy and be used to counterattack and regain the initiative. At times this situation will be a subset of the above mentioned strategic and operational defensive. But a commander also could be on the strategic and operational offensive even when outnumbered - witness the 1967 Israeli pre-emptive strike. Historically, the RAF and SAAF used air reserves when outnumbered - Battle of Britain and the Kuban. Israel did the same in 1967. In contemporary developments, the factor of class (readiness and training of the air force) as well as technological superiority, is a definite combat multiplier.

Being outclassed by your opponent's air force is another situation where air reserves can be useful. The more one is outclassed by his opponent, the greater the need for air reserves. Theoretically, the reserve will help counter unforeseen threats and help to regain the initiative due to being outclassed. This situation can occur when on the defensive or offensive. The Soviets used Stavka air reserves to weight their main efforts when they were outclassed by the Luftwaffe. Likewise, Egypt put its air force into strategic reserve temporarily after their surprise strike on Israel in the 1973 Yom Kippur War. They knew they could not survive in air combat

against Israel. Based on review of theory, history and contemporary developments four distinct hypotheses emerge in which an air reserve appears to be useful to an operational commander:

The air situation is too ambiguous to judge properly.

The commander is on the operational defensive.

The commander is outnumbered by his opponent.

The commander is outclassed by his opponent.

In order to analyze these hypotheses one must have appropriate operational criteria against which to judge them. In The Air Campaign, Warden developed five cases of war to simplify operational analysis of air situations.¹⁹¹ Figure 1 shows a notional theater of operations with these five cases.

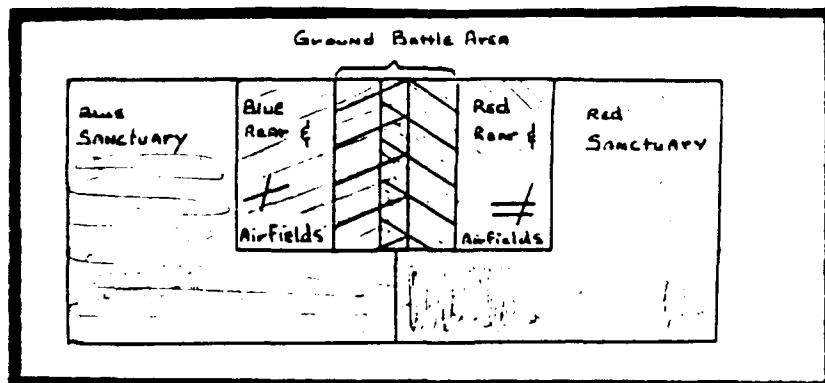


FIGURE 1.

One may look at this Figure to determine which particular operational case pertains to him. Case I is a situation where each side (Red and Blue) has equal capability to threaten the other throughout the theater of operations. Both sides are at risk over both the ground battle area and their rear areas, which include their airbases. In Case 2, Blue can outrange Red with his air force. Therefore, Red's rear areas, including airbases; are at risk; but Blue's are not. Case 3 is the opposite of Case 2. Here Red outranges Blue, holding Blue's rear area and airbases at risk. In Case 4, neither Blue nor Red can range into the other's rear. In this case the ground battle area is also exclusively the air battle area.

Assuming that we are Blue, we shall analyze the various hypotheses against each case. This is a logical way to examine the hypotheses since an operational commander can quickly judge which case applies to him. A matrix of this analysis is located in Appendix E.

Starting with Case I, we know that each side has equal capability to range the other and put its rear and airfields at risk. If the Red force chooses to decline battle by flying its air force to a sanctuary, that will simply abrogate the need for a Blue air reserve in any of the cases. If the air situation is ambiguous in Case I, then a Blue air reserve is needed. If, for example, Red could destroy Blue's air force on the ground in a pre-emptive strike, Blue should invest in hardened shelters

and an IADS. Also if Blue is on the strategic and operational defense, it follows that a Blue air reserve is needed. Likewise when Blue is outnumbered or outclassed, a Blue air reserve is warranted. The situation changes, however, in Case II.

In Case, II Blue has the advantage of range over Red. If the air situation is ambiguous or Blue is on the strategic or operational defense, he still will not need an air reserve because of the range advantage. He could chose to constitute one, but it's unneeded. In the case where Blue is outnumbered or outclassed though, a Blue air reserve may be necessary. The Blue force may approach a certain correlation of forces (in quantity and/or quality) where they determine an air reserve is necessary. Case III, in contrast, puts Blue at a disadvantage.

In Case III, Red outranges Blue and places his rear and airbases at risk. Assuming Blue accepts battle, an air reserve is needed in each hypothetical situation. If two or more hypotheses are present then the size of the Blue air reserve should increase.

Case IV is unique in that each side can only range over the ground battle area. The Blue and Red situations are equal in Case IV, with each side fighting only over the ground forces and not threatening the rear areas or airbases of the other side. Assuming no superpower resupply of aircraft or pilots, all the hypotheses are valid. The air battles will probably be limited to

attritional type encounters since neither the rear or airbases can be threatened. Therefore, in each situation an air reserve is warranted.

To summarise this analysis, all hypotheses appear valid except in Case 2 where the first and second hypotheses appear to be invalid. The third and fourth hypotheses of Case 2 appear to be valid only in special circumstances. This case can be treated as an exception to the rules.

VI. Conclusions

This monograph has explored the question: "Under what conditions should an operational commander constitute an air reserve?" After careful review of theory, history, and contemporary experience, it concludes that constitution of an air reserve is warranted under the following conditions:

The air situation is too ambiguous to judge properly.

The commander is on the operational defensive.

The commander is outnumbered by his opponent.

The commander is outclassed by his opponent.

Any combination of the above.

Obviously the prudent commander must exercise judgment in using these conditions to signal constitution of an air reserve. Rarely will all operational indicators point in the same direction during combat conditions.

Therefore, the operational commander must decide which conditions are most important in his particular situation. These considerations will affect the size of the operational air reserve, if any, that he constitutes.

In the introduction, the monograph acknowledged that some airmen consider the concept of air reserves an abomination. In this view, aerospace forces have unmatched advantages in speed, range, and flexibility unequaled by enemy ground-based air defense forces.¹⁹² It follows in that view that holding any portion of an air force in reserve would be wasting its offensive capabilities. But theoretically, every offense has a defense. Historically, the study has shown that warfare, including modern air warfare, has competing qualities of offense and defense that are increasingly affected by new technology. What was abominable when airpower was offensively dominant, may now be more palatable as ground-based air defensive systems have become deadlier.

Britain and the Soviet Union used air reserves successfully in World War II. In limited war, Israel (1967) and Egypt (1973), both constituted air reserves, with Egypt employing hers. An operational commander may elect to constitute an air reserve at any time, whether on the offense or defense. However, this study indicates that when the operational commander is in an ambiguous situation, on the operational defense, or outnumbered or outclassed by his opponent, he should strongly consider

constituting an air reserve. ¹⁹³

VII. Implications

Based on these conclusions, current doctrine was examined for evidence of the concept of air reserves.¹⁹⁴ JCS Pub 3-0, Doctrine for Joint Operations, mentions reserves in Annex C: Campaign Plan Format. Though not specifically mentioning air reserves, it does ask where the reserves are located and their composition. It also stipulates that the reserves should be given "Be prepared" missions.¹⁹⁵ Air Force Manual 1-1, Basic Aerospace Doctrine, [USAF basic level doctrine] makes no mention of air reserves.¹⁹⁶ Tactical Air Command Manual 2-1, Tactical Air Operations [USAF operational level fighter doctrine], is void of any discussion on air reserves.¹⁹⁷ Finally, Multi Command Manual 3-1, Volume 1, Mission Employment Tactics, Tactical Employment, General Planning and Employment Consideration [USAF tactical level fighter doctrine] is also deficient in this area.¹⁹⁸

This monograph is not a definitive study on the concept of air reserves. It has not addressed questions on when to commit operational air reserves or how to employ them. The United States Air Force could deploy forces to a theater of war in the future where it will be in an ambiguous air situation or on the strategic and operational defense. Its not beyond the realm of possibility that the USAF will be outnumbered, or perhaps

even outclassed in such a situation. For that reason, it appears that a complete analysis of the concept of air reserves is therefore warranted. When that analysis is complete, USAF doctrine should be updated accordingly.

APPENDIX A

Definitions

Airborne Alert. A state of aircraft readiness wherein combat-equipped aircraft are airborne and ready for immediate action. It is designed to reduce reaction time and to increase the survivability factor. (JCS Pub 1, p. 10)

Air Neutrality. Air neutrality suggests that neither side has won sufficient control of the air to operate without great danger. (Warden. The Air Campaign. pp. 13-14)

Air Superiority. The degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force. (Janes Dictionary of Military Terms, p. 13)

[Added] "Air superiority is a necessity. Since the German attack on Poland in 1939, no country has won a war in the face of enemy air superiority. No major offensive has succeeded against an opponent who controlled the air, and no defense has sustained itself against an enemy who had air superiority. Conversely, no state has lost a war while it maintained air superiority, and attainment of air superiority consistently has been a prelude to military victory. It is vital that national and theater commanders, their air component commanders, and their surface component commanders be aware of these historical facts, and plan accordingly." (Warden. The Air Campaign. p. 13)

Air Supremacy. That degree of air superiority wherein the opposing air force is incapable of effective interference. (Jane's Dictionary of Military Terms, p. 13)

[added] "The ability to operate air forces anywhere without opposition." (Warden. The Air Campaign. p. 13.)

Alert. Readiness for action, defense or protection. The period of time during which troops stand by in response to an alarm. (JCS Pub 1, p. 24)

Alert Force. Specified forces maintained in a special degree of readiness. (JCS Pub. 1, page 24)

Area of Operations. [Similar to theater of operations] That portion of an area of war necessary for military operations and for the administration of such operations. (JCS Pub 1, p. 34)

Area of War. [Similar to Theater of War.] 'That area of land, sea and air which is, or may become directly involved in the operations of war.' (JCS Pub 1, p. 34)

Augmentation Forces. Forces to be transferred to the operational command of a supported commander during the execution of an operation. (JCS Pub. 1, page 42)

Campaign. Undefined. (JCS Pub 1)

Campaign. A series of joint actions designed to attain strategic objectives in a theater of war. (FM 100-5, Operations, May 1986, p. 10)

Campaign. A connected series of military operations forming a distinct phase of a war to accomplish a long-range major strategic objective. (FM 101-5-1, Operational Terms and Symbols, 21 Oct. 1985, p. 1-13)

Campaign Plan. A plan for a series of related military operations aimed to accomplish a common objective, normally within a given time and space. (JCS Pub 1, p. 60)

Defensive Air Superiority. A condition in which enemy air cannot operate over some part of one's territory, and where one's own Air Force (if one exists) is equally unable to operate against the enemy. (Warden. The Air Campaign. p. 14.)

General Reserve - Reserve of troops under the control of the overall commander. (JCS Pub. 1, p. 158)

Joint Doctrine. Fundamental principles that guide the employment of forces of two or more Services in coordinated action toward a common objective. It will be promulgated by the Joint Chiefs of Staff. (Enclosure to JMTGM-76-88, page 15.)

Joint Operation. A military action or the carrying out of a strategic, operational, tactical, service, training, or administrative military mission by forces from two or more Military Departments; also, the conduct of combat, including movement, supply, attack, defense, and maneuvers needed to gain the objectives at any battle or campaign. (JCS Pub. 3-0, page VIII.)

Joint Tactics, Techniques, and Procedures. The actions and methods which implement joint doctrine and describe how forces will be employed in joint operations. They will be promulgated by the Joint Chiefs of Staff. (Enclosure to JMTGM-76-88, page 16.)

Joint Task Force. A force composed of assigned or attached elements of the Army, the Navy or the Marine Corps and the Air Force, or two or more of these Services, which is constituted and so designated by the Secretary of Defense or by the commander of a unified command, a specified command, or an existing joint task force. (JCS Pub. 1, page 202.)

Local Air Superiority. Basic air freedom of movement over a limited area for a finite period of time. (Warden. The Air Campaign. p. 13)

Multi-service Doctrine. Fundamental principles that guide the employment of force of two or three services of the same nation in coordinated action toward a common objective. It is ratified by two or three Services, and is normally promulgated in joint Service publications that identify the participating service, e.g. Army-Navy Doctrine. (JCS Pub 1, page 242.)

Operational Level of War. The level of war at which campaigns and major operations are planned, conducted and sustained to accomplish strategic objectives within theaters or areas of operation. Activities at this level link tactics and strategy by establishing operational objectives needed to accomplish the strategic objectives; sequencing events to achieve the operational objectives; initiating actions, and applying resources to bring about and sustain these events. These activities imply a broader dimension of time or space than do tactics; they ensure the logistic and administrative support at tactical forces; and provide the means by which tactical successes are exploited to achieve strategic objectives. (Enclosure to JMTGM-76-88, page 2.)

Range. Extent or distance limiting the operation or action of something, such as the range of an aircraft, ship, or gun. (JCS Pub. 1, page 301)

Radius of action. The maximum distance a ship, aircraft, or vehicle can travel away from its base along a given course with normal combat load and return without refueling, allowing for all safety and operating factors. (JCS Pub. 1, page 301)

Redistribution. The act of effecting transfer in control, utilization, or location of material between units or activities within or among the military services or between the military services and other federal agencies. (JCS Pub. 1, page 306)

Reinforcing Force. In rapid reinforcement planning, a force in being which is made available to a major NATO commander by nations to supplement in-place force. (JCS Pub. 1, page 308)

Reserve. 1. A portion of a body of troops that is deep to the rear or withheld from action at the beginning of an engagement, in order to be available for a decisive movement. Any force not engaged or highly engaged may also be designated or employed as a reserve. The timely use of one's reserves is one of the most important aspects to the art of command. Clausewitz wrote in On War: 'Fatigue the opponent, if possible, with few forces and conserve a decisive mass for the critical moment. Once this decisive mass has been thrown in, it must be used with the greatest audacity.' (Facts on File. Dictionary of Military Science. Shafritz. p. 391)

Reserve Aircraft. Those aircraft which have been accumulated in excess of immediate needs for active aircraft and are retained in the inventory against possible future needs. (JCS Pub. 1, p. 312)

Strategic Level of War. The level of war at which a nation or group of nations determines national or alliance security objectives and develops and uses national resources to accomplish those objectives. Activities at this level establish national and alliance military objectives; sequence initiatives, define limits and assess risks for the use of military and other instruments of power; develop global or theater war plans to achieve those objectives; and provide armed forces and other capabilities in accordance with the strategic plan. (Enclosure to JMTGM-76-88, page 1.)

Tactical Level of War. The level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives. (Enclosure to JMTGM-76-88, page 3)

Theater Air Superiority. Theater air superiority, or supremacy, means that friendly air can operate any place within the entire combat theater. (Warden. The Air Campaign. p. 13.)

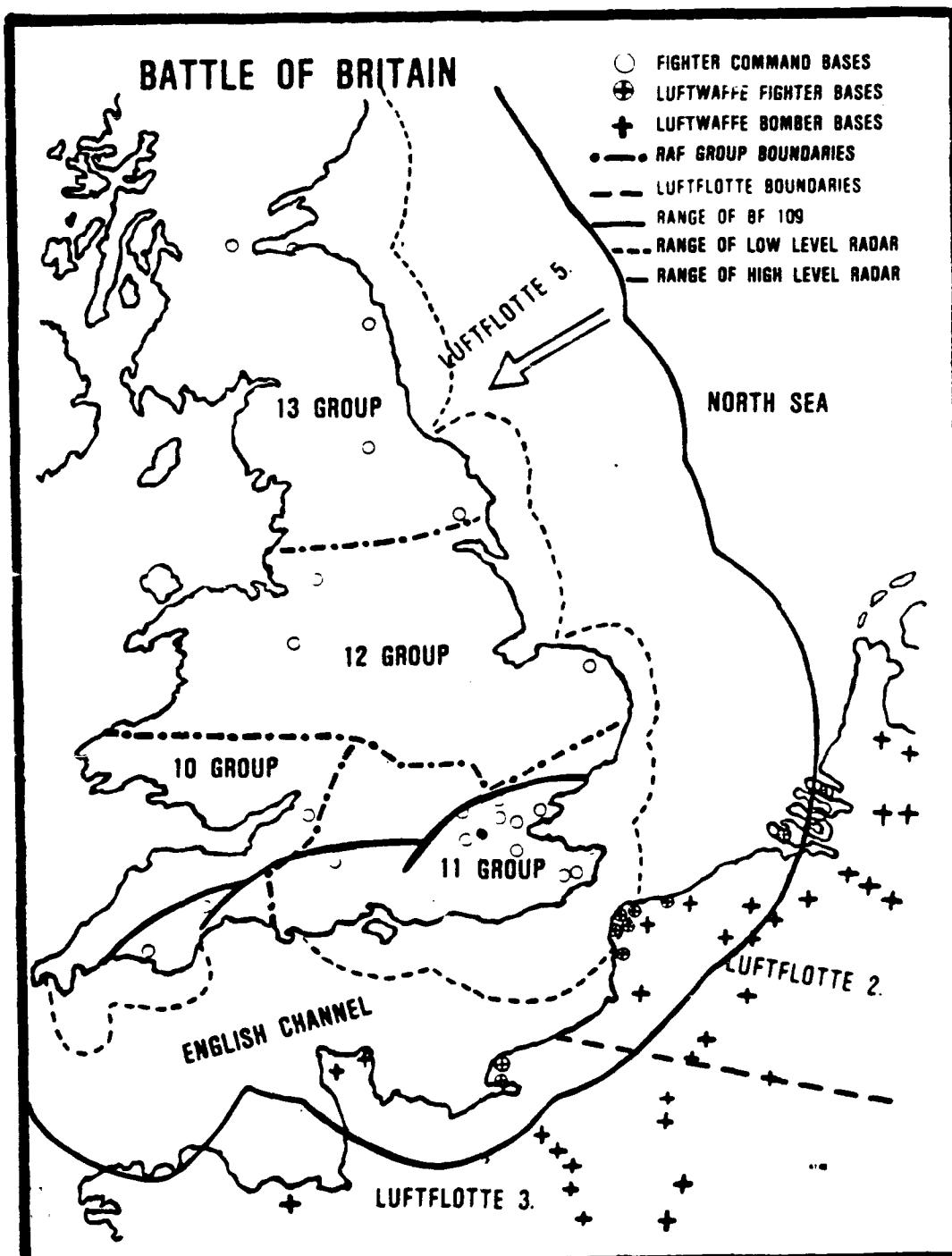
Theater of Operations. By 'theater of operations' we mean, strictly speaking, a sector of the total war area which has protected boundaries and so a certain degree of independence. (Clausewitz, On War, p. 280.)

[added] The theater of operations of an army embraces all the territory it may desire to invade and all that it may be necessary to defend. (Jomini, Art of War, p. 67-68)

Theater of War. The theater of war embraces all the countries in which two powers may attack, whether by their own territory, or by that of their allies, or of the secondary powers which they will draw into the vortex through fear or interest. When a war is complicated with maritime operations, then its theatre is not restrained to the frontiers of a State, but may embrace the two hemispheres, as has happened in the struggles between France and England, from Louis XIV down to our day. (Jomini, Art of War, p. 84)

Unit Reserves. Prescribed quantities of supplies carried by a unit as a reserve to cover emergencies. (JCS Pub 1, p. 385)

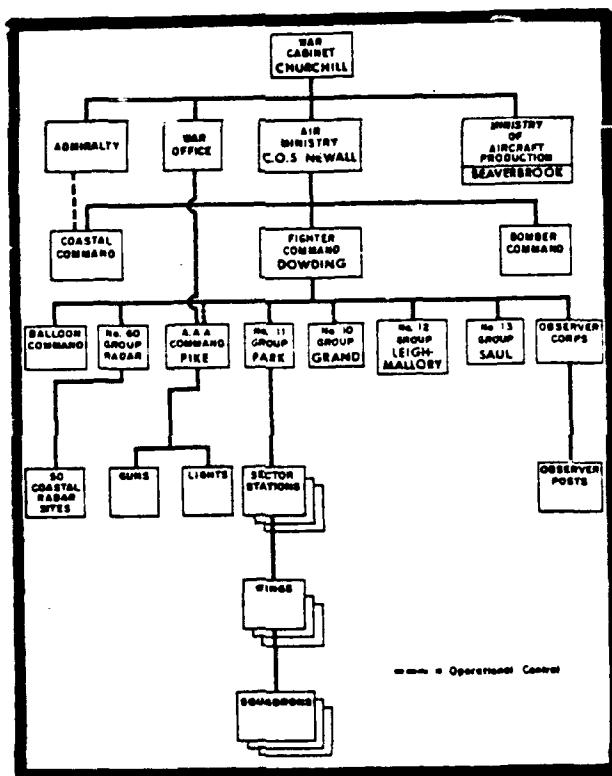
APPENDIX B
Theater of Operations
Battle of Britain



Source: Murray, Strategy For Defeat: The Luftwaffe 1933 - 1945, page 49.

British Chain of Command

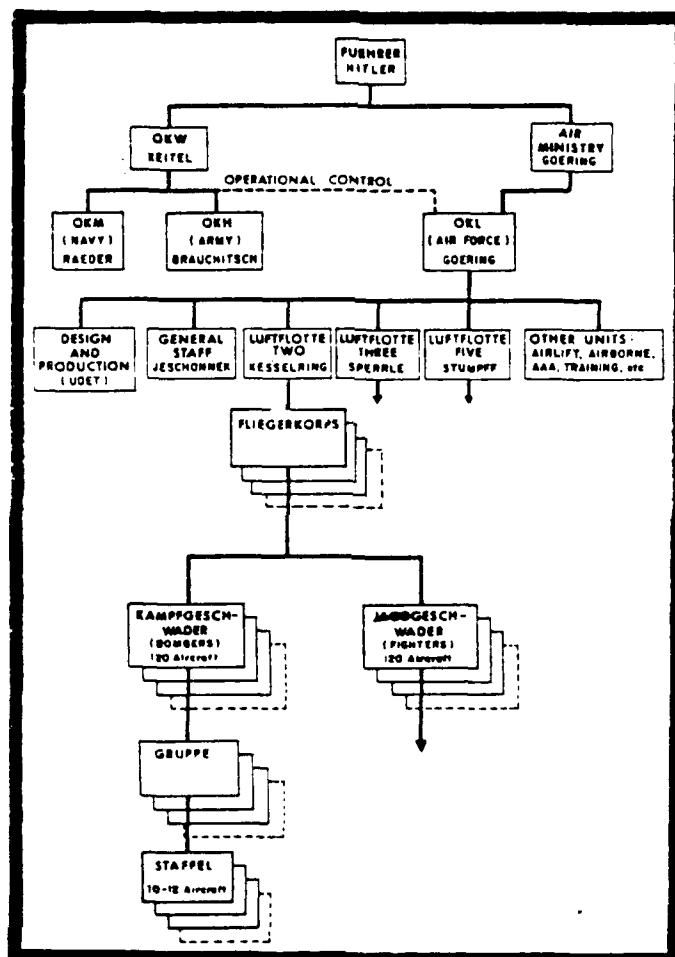
Battle of Britain



Source: Greiss, The Second World War: Europe and the Mediterranean, page 62.

German Chain of Command

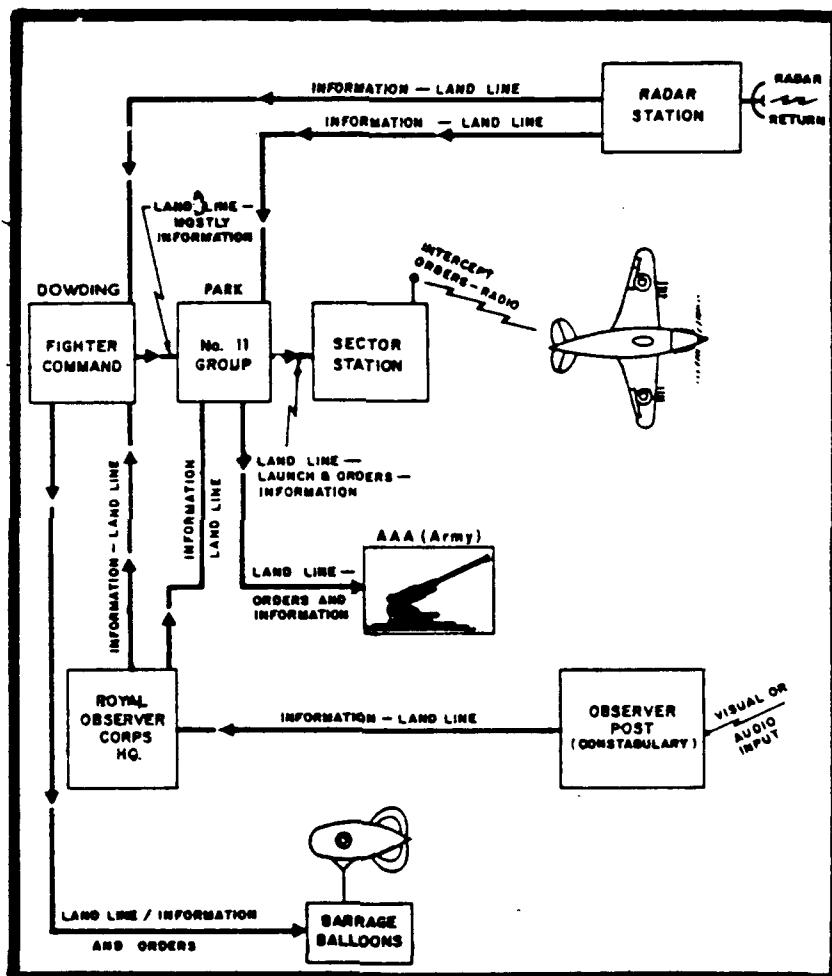
Battle of Britain



Source: Greiss, The Second World War: Europe and the Mediterranean, page 74.

British Command and Control System

Battle of Britain



Source: Greiss, The Second World War: Europe and the Mediterranean, page 74.

Comparative Air Orders of Battle

Battle of Britain

Opposing Forces, Battle of Britain
August 8, 1940

Operational RAF Fighters

	10 Group 10 Sqdns	11 Group 23 Sqdns	12 Group 16 Sqdns	13 Group 14 Sqdns	Total 62 Sqdns
Spitfires	51	81	100	44	276
Hurricanes	69	245	85	150	549
Defiants	-	-	30	-	30
Blenheims	9	17	21	11	58
Gladiators	5	-	-	-	5
Totals	134	343	236	205	918

There were about 200 additional fighters in squadron reserves. Fighters in storage ready for issue were as follows:

Defiant	80
Hurricane	183
Spitfire	143

Luftraffe Strength
August 13, 1940

<i>Luftraffe</i> (No.)	2	3	5	Total
Single engined Fighters (Me109)	480	265	35	780
Twin engined Fighters (Me110)	126	68	20	214
Single engine Bombers (Ju87)	42	234	-	276
Twin engined Bombers (Ju88, He111, Do17)	469	299	100	868
Four engined Bombers (FW 200)	-	7	-	-
Long Range Night Fighters (Ju88)	14	-	-	14
Reconnaissance Aircraft (Ju88, He111, Do17, Me110)	26	26	15	67
Totals	1157	899	170	2226

Source: Kreis, Air Warfare and Airbase Defense, page 79.

Aircraft Losses
Battle of Britain

Comparison of British and German Figures for Aircraft Lost

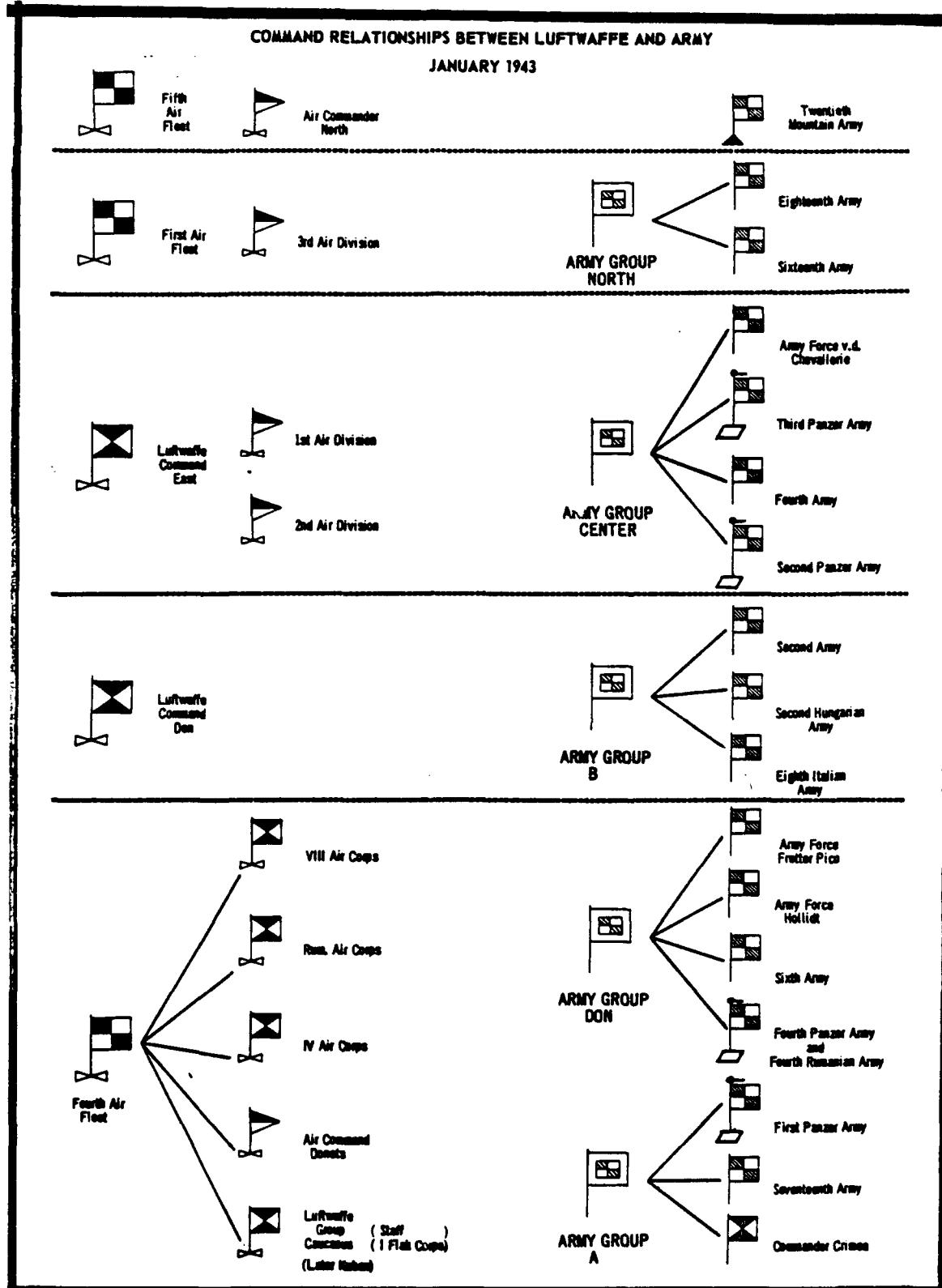
	<i>RAF claim 1940</i>	<i>RAF claim post-war</i>	<i>German High Command diary</i>
15 August	185	76	55
18 August	155	71	49
15 September	185	56	50
27 September	153	55	42
Totals	678	258	196

Source: Deighton, Fighter, page 235.

APPENDIX C
Theater of Operations
The Kuban



Source: Central Intelligence Agency: Western Soviet Union Regions Map #800767 (542601) 7-86

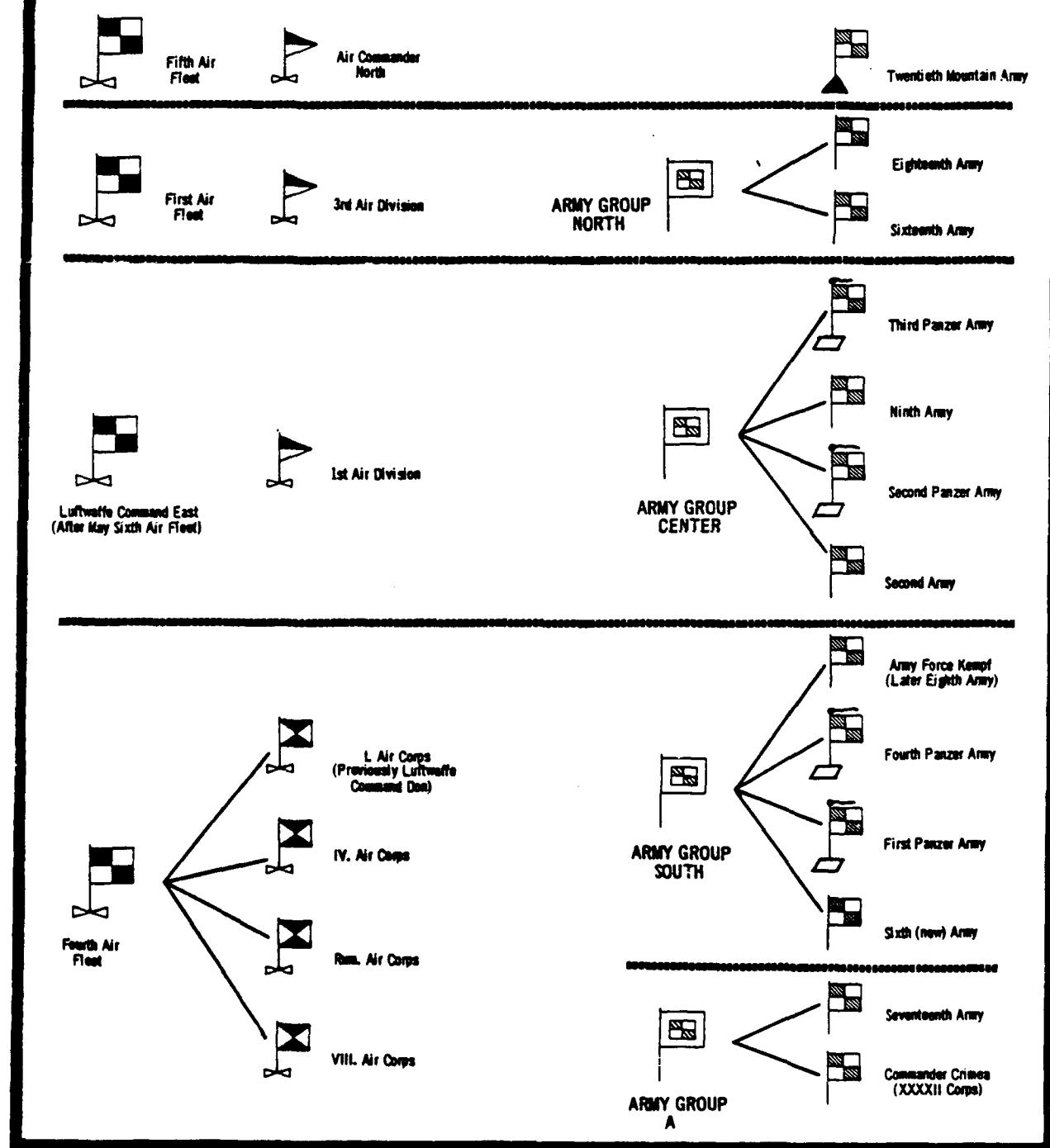


Source: Plocher, The German Air Force VS Russia: 1943,
page 362.

Luftwaffe Chain of Command

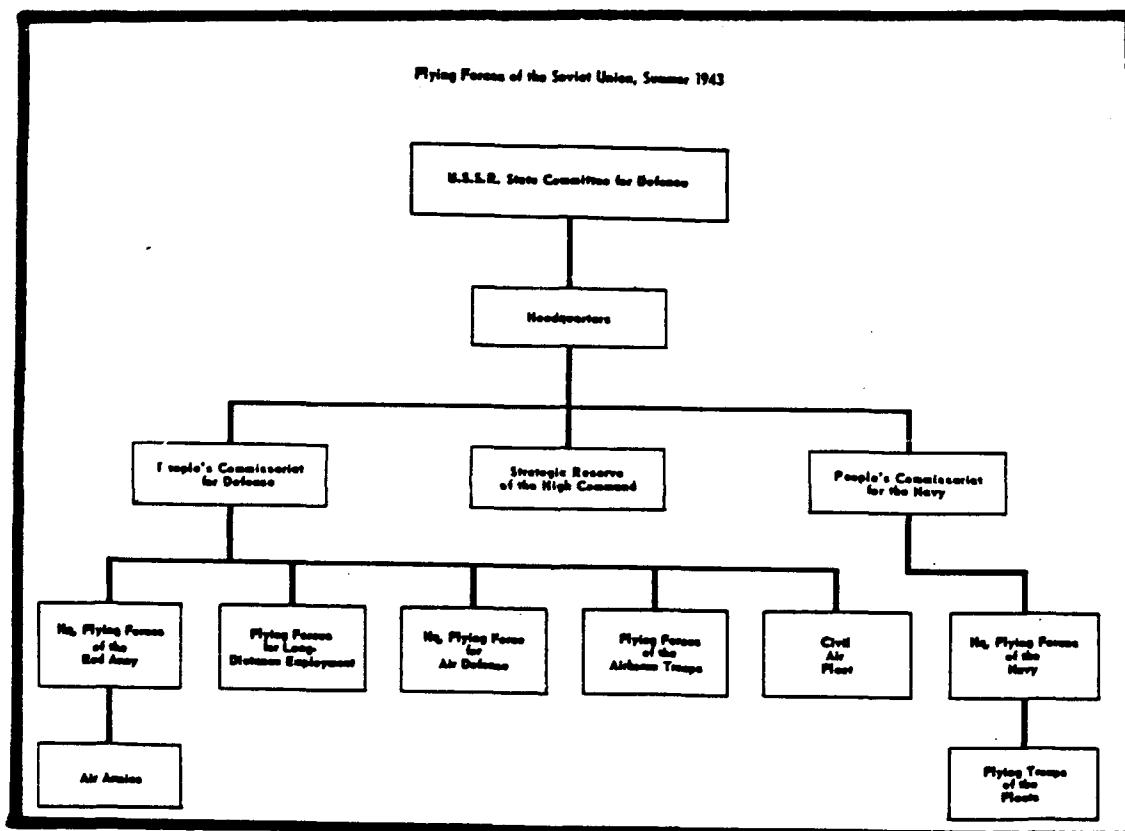
Chart 2

COMMAND RELATIONSHIPS BETWEEN LUFTWAFFE AND ARMY
END OF MARCH 1943



Source: Plocher, The German Air Force VS Russia: 1943,
page 363.

Soviet Chain of Command



Source: Plocher, The German Air Force VS Russia: 1943,
page 368.

APPENDIX D
Comparative Air Orders of Battle
1967 War

Israeli Air Force		No. of Aircraft		
Type				
Fighter and Fighter Bomber				
Super Mystere*		40		
Mystere IV A		40		
Mirage III J		64		
Ouragon		48		
Vautour II A		25		
Training				
Fouga Magister**		60		
Transport				
Noratlas and Boeing Stratocruiser		20		
Helicopter				
(Super Frelon, Sikorsky H-34, H-55, Alouette)		<u>25</u>		
Total		322		
* Twenty were on loan from France for training and were returned after the fighting. Official Israeli figures vary slightly.				
** Fitted with rockets for ground attack.				
Arab Air Forces				
Type	Egypt	Syria	Iraq	Jordan
Fighter and Fighter Bomber				
MiG-21	120	20	60	-
MiG-19	80	20	30	-
MiG-15,-17	180	60	-	-
Su-7	20	-	-	-
Hawker Hunter	-	-	50	22
Bomber				
Tu-16	30	-	6	-
Il-28	40	6	10	-
Transport				
Il-14	60	-	-	-
An-12	25	-	-	-
Helicopters	60	-	-	26
Mixed types				40
Training and Miscellaneous	<u>120</u>	<u>-</u>	<u>20</u>	<u>-</u>
Total	735	106	176	88

Source: Kries, Air Warfare and Airbase Defense,
page 308.

Comparative Air Orders of Battle

1973 War

Israel Air Force		No. of Aircraft	
Type			
Fighter and Fighter-Bomber			
F-4		101	
A4		162	
Mirage		67	
Super Mystere (SMB-2)		20	
Assault Helicopters		40	
		<u>309</u>	
<hr/>			
Arab Air Forces			
Type	Egypt	Syria	Total
Fighter and Fighter-Bomber			
MiG-21D	—	20	20
MiG-21F	20	16	36
MiG-21J	180		212
MiG-21	—	34	34
MiG-15	16	—	16
Su-7	50	39	89
Su-20	15	—	15
MiG-21C & E	60	4	64
MiG-17	90	84	174
Reconnaissance			
Su-7	6	—	6
MiG-21	6	4	10
Bomber			
Tu-16	26	—	26
Additional Probable			
Modified Su-20	30	30	60
Hawker Hunter	37	—	37
Mirage	27	—	27
Probable Maximum	<u>563</u>	<u>263</u>	<u>826</u>

Source: Kries, Air Warfare and Airbase Defense, page 332.

Comparative Defensive Strengths

1973 War

Israel Air Defense Systems

Type	Number
20-mm Mk I Polsten (UK)	180
20-mm HSS-804 (Swiss)	420
37-mm (Italy)	50
37-mm (USSR) M1939	Undetermined
40-mm (W. Ger.)	54
40-mm (UK)	15
40-mm Bofors L/70 (Swiss F/C)	150
57-mm S60 (USSR)	Undetermined
3.7 in. (UK)	Undetermined
	Total 869 +
Hawk Missiles	400
Hawk Launchers	72

Egyptian Air Defense Systems

Type	Number
12.7-mm Quad. Barrel (Czech)	363-441
14.5-mm ZPU 2/4 (USSR)	306-334
23-mm ZU 23 (USSR)	379-457
20-mm M53-M-57 (Yugoslavia)	400
37-mm M1939 (USSR)	435-513
57-mm S60 (USSR)	225
85-mm KS-12 and M1944 (USSR/Czech)	180
100-mm KS-19 (USSR)	362
23-mm ZSU/23 SP (USSR)	6 or 7 battalions
57-mm ZSU/57 SP (USSR)	263
	Total 2886-3148 +
SA-2 Missiles (Estimates)	1700
Launchers	420
SA-3 Missiles	1400
Launchers	200
SA-6 Missiles	300
Launchers	20
SA-7 Missiles (128 Platoons)	15-20,000

Source: Kries, Air Warfare and Airbase Defense, page 333

Syrian Defensive Systems

1973

Type	Number (all figures are estimates)
12.7-mm Quad Barrel (Czech)	425
14.5-mm Quad ZPU4 (USSR)	195
20-mm Single and Triple mount (Swiss)	255
30-mm HSS-831 (Swiss)	32
37-mm M1939 (USSR)	290
40-mm Bofors 4/70 (Spain)	30
57-mm S60 (USSR)	225
85-mm M1944 (Czech)	100
85-mm KS-12 (USSR)	40
100-mm KS-19 (USSR)	170
130-mm KS-30 (USSR)	74
23-mm ZPU 23/4 SP (USSR)	80-100
57-mm ZPU 57/2 SP (USSR)	Undetermined
Total	1916 +
SA-2 Missiles	200
Launchers	70
SA-3 Missiles	100
Launchers	20
SA-6 Missiles	Undetermined
Launchers	60
SA-7 Missiles (64 platoons)	10,000

Source: Kries, Air Warfare and Airbase Defense, page 335.

Aircraft Losses

1973

Israel

Cause of Loss	F-4	A-4	Mystere	Mirage	Helicopter	Misc
SA-2, -3, -6	9	27	1	2	1	-
AAA	9	12	2	4	3	1
SA-2, -3, -6 and AAA	1	1	1	-	-	-
SA-7	-	2	1	-	-	1
SA-7 and AAA	1	2	-	-	-	-
Tech. Failure	4	-	1	3	1	-
Interception	3	-	-	-	-	-
Unknown	3	6	-	1	-	-
Other	2	3	-	1	-	-
Total	32	53	6	11	5	2 = 109

Loss on Type of Mission

SAM Suppression	8	6	-	-	-	-
Interception	3	-	-	3	-	-
Patrol	2	-	-	8	-	-
Strategic	2	-	-	-	-	-
Airfield Attack	7	-	-	-	-	-
Close Suppor:	8	47	6	-	-	-
Other	2	-	-	-	5	2
Total	32	53	6	11	5	2 = 109

Egypt and Syria

Cause of Loss

Air-to-Air Combat	334	(destroyed by IAF fighters)
Airfield Attack	22	(Destroyed on ground)
Army Ground Weapons	36	
Hawk SAM	23	(18 aircraft + 5 helos.)
20-mm AA	42	
Unknown	59*	
Total	516	(480 fixed-wing + 36 helicopters)

* Most thought to have been shot down by friendly AA fire.

Source: Kries, Air Warfare and Airbase Defense, page 335.

APPENDIX E

Analysis Matrix of Hypotheses in 4 Cases of War

MATRIX 1

ANALYSIS OF HYPOTHESES IN EACH CASE OF WAR

		HYPOTHESIS			
		AMBIGUOUS AIR SITUATION	STRATEGIC OPERATIONAL DEFENSE	BLUE OUTNUMBERED	BLUE OUTCLASSED
CASE 1 All things are equal (range & risk)		HYPOTHESIS VALID	HYPOTHESIS VALID	HYPOTHESIS VALID	HYPOTHESIS VALID
CASE 2 Blue outranges Red Red rear & airbases at risk		HYPOTHESIS INVALID	HYPOTHESIS INVALID	HYPOTHESIS INVALID UNTIL A MINIMUM CORRELATION OF FORCES IS REACHED	HYPOTHESIS INVALID UNTIL A MINIMUM CORRELATION OF FORCES IS REACHED
CASE 3 Red outranges Blue Blue rear & airbases at risk		HYPOTHESIS VALID	HYPOTHESIS VALID	HYPOTHESIS VALID	HYPOTHESIS VALID
CASE 4 Red & Blue air fights over ground battle area only Red & Blue rear & airbases are safe.		HYPOTHESIS VALID	HYPOTHESIS VALID	HYPOTHESIS VALID	HYPOTHESIS VALID

ENDNOTES

¹ "Reserve" in this monograph does not refer to members of military services who are not in active service but who are subject to call to active duty. [ex. Air Force Reserve or Air National Guard]

John A. Warden, III., Colonel, USAF, The Air Campaign: Planning For Combat. (Washington, D.C.: National Defense University Press, 1988), p. 71.

Joint Chiefs of Staff, JCS Pub. 1, Department of Defense Dictionary of Military and Associated Terms. (Washington, D.C.: The Joint Chiefs of Staff, 1 June 1987), p. 312.

²The common Air Force lament is that air, like artillery, is never held in reserve. Personal interview with an un-named USAF Colonel, 22 March 1990.

³Warden, p. 115.

⁴John T. Correll, "The \$64 Billion Question," Air Force Magazine (March 1970): p. 2.

⁵Colin L. Powell, Gen., "Is The Future What It Used To Be?" Defense 90 (Jan/Feb): p. 7.

Report of the Commission on Integrated Long-Term Strategy, Discriminate Deterrence (Washington, D.C.: G.P.O. January 1988), pp. 3,11,43.

⁶Powell, p. 7.

⁷"Theater of war" and "theater of operations" are cross-referenced in JCS Pub 1 to "area of war" and "area of operations." JCS Pub 1, p. 34.

⁸Furthermore: "Any sound military plan will retain an operational reserve under the overall commander's control, in order to reinforce active units in terms of exploiting their strength or to shoring up of weak points." JCS Pub 1, p. 264;

Jay M. Shafritz and others, The Facts on File Dictionary of Military Science (New York: Facts on File, 1989), p. 337.

⁹It is similar to a regional reserve: a reinforcing force, not yet committed to a specific task, but available as required for employment or engagement within a subordinate command area of responsibility. JCS Pub 1, pp. 307, 350.

¹⁰The definition is adapted from Dupuy. Dictionary of Military Terms. Comp. by Trevor N. Dupuy and others. (New York: H.W. Wilson Company, 1986), p. 186.

¹¹Carl Von Clausewitz, On War. Ed. and Trans. Michael Howard and Peter Paret. (Princeton, NJ: Princeton University Press, 1976), p. 141.

¹²Ibid., pp. 134, 141.

¹³Clausewitz, pp. 134, 141; William G. Robertson, The Staff Ride (Washington, D.C.: Center of Military History, U.S. Army, 1987), p. 1.

¹⁴Gregory M. Eckert, Operational Reserves in AFCENT: Another Look (School of Advanced Military Studies, Fort Leavenworth, KS., 1986), p. 44.

Charles R. Gregory, Operational Reserves Reviewing the Offensive Spirit. (School of Advanced Military Studies, Fort Leavenworth, KS, 1986), p. 40.

¹⁵Clausewitz, p. 128.

¹⁶Baron de Jomini, Summary of the Art of War (New York: G.P. Putnam & Co., 1854), Reprinted at CGSC, SAMS, Course Readings AY 89/90.

¹⁷For an indept look at operational art, see Jim Schneider's The Theory of Operational Art.

James J. Schneider, The Theory of Operational Art (School of Advanced Military Studies, Fort Leavenworth, KS, 1 March 1988), pp. 14, 52.

Department of the Army FM 100-5, Operations (Washington, D.C.: Headquarters Department of the Army, 5 May 1986), p. 10.

¹⁸Gregory, p. 6.

¹⁹Clausewitz, p. 211.

²⁰Ibid.

²¹Clausewitz, p. 172.

²²Ibid., p. 210.

²³Ibid.. pp. 194-195, 209.

²⁴"Even in a defensive position awaiting the enemy assault, our bullets take up the offensive. So the defensive form of war is not a simple shield, but a shield made up of well directed blows." Clausewitz, p. 523.

²⁵Ibid.

²⁶Ibid.

²⁷Following this logic, the timely introduction of a strong reserve at the decisive time and place could bind battles together to change the character of the campaign. Clausewitz, pp. 242-243.

²⁸Ibid., p. 269.

²⁹Schneider, p. 39.

³⁰Jomini, p. 148;

Also see the Appendices in The Campaigns of Napoleon by David Chandler, which show the strength of Napoleon's L' Armee de Reserve.

Crane Brinton, Gordon A. Craig and Felix Gilbert, 'Jomini,' Chapter 4 in Makers of Modern Strategy: Military Thought From Machiavelli to Hitler, Edward M. Earle, Ed. (Princeton, NJ: Princeton University Press, 1986), p. 172.

John Shy, 'Jomini,' Chapter 6 in Makers of Modern Strategy: Military Thought From Machiavelli to the Nuclear Age, Peter Paret, Ed., (Princeton, NJ: Princeton University Press, 1986), p. 172.

³¹From the highest strategic level to the lowest tactical level, reserves played an important part. Jomini, p. 147.

³²Gregory, p. 5; Jomini, p. 147.

³³Brinton, Craig, and Gilbert, pp. 88-89.

³⁴Jomini, pp. 147-148.

³⁵Jomini, p. 148.

Albert F. Turner, Major, USA, The Operational Reserve - What Should It Be Used For? (School of Advanced Military Studies, Fort Leavenworth, KS: 6 May 1988), p. 42.

³⁶Turner's monograph has a good synopsis of Triandifilov's, Mao Tse Tung's, and Willoughby's views on reserves. Turner, p. 5.

³⁷Jomini, p. 185; Turner, p. 5.

³⁸Jomini, pp. 147-148.

³⁹Jomini, pp. 148-149.

⁴⁰Schneider, pp. 8-22.

⁴¹John C. Cooper, 'The Fundamentals of Airpower,' Chapter II, Essay 26 in The Impact of Airpower, Eugene M. Emme, Ed., (New York: D. Van Nostrand Company, Inc., 1959), p. 128.

⁴²David MacIsaac, 'Voices From The Central Blue,' Part 4, Chapter 21 in Makers of Modern Strategy: From Machiavelli to the Nuclear Age. Paret, Peter. Ed. (Princeton, NJ: Princeton University Press, 1986), p. 626.

⁴³Frank J. Cappelutti, The Life and Thought of Giulio Douhet (New Brunswick, NJ: Rutgers University, 1967), p. 166.

⁴⁴ William A. Mitchell, Brig. Gen., Our Air Force, The Keystone of National Defense (New York: E.P. Dutton, 1921), p. 22.

⁴⁵Edward Warner, 'Douhet, Mitchell, Seversky: Theories of Air Warfare,' Chapter 20 in Makers of Modern Strategy: Military Thought From Machiavelli to Hitler, (Princeton, NJ: Princeton University Press, 1948), pp. 498-499.

⁴⁶Alexander P. de Seversky, Maj., Victory Through Airpower (New York: Simon and Schuster, 1942), p. 324.

⁴⁷Warden, pp. 115-127.

⁴⁸Ibid., p. 494.

⁴⁹Joseph A. Mitchell, Col., 'Command of the Air: Douhet's Views in Perspective', Marine Corps Gazette (December 1967): p 50.

⁵⁰Douhet, Giulio. The Command of the Air. Trans. Dino Ferrari. New Imprint. (Washington D.C.: Office of Air Force History, 1983), pp. 55, 194; Warner, pp. 489, 494.

⁵¹Warner, p. 494.

⁵²Warner, pp. 489-497.

⁵³Douhet, p. 24.

⁵⁴Douhet couched his views in his World War I experience. He had seen the carnage and waste of human life in the trenches. He had also seen each side's bombers unload ordnance on cities, at will, undaunted by fighters or anti aircraft artillery (AAA). Douhet, p. 28.

⁵⁵Command of the air was his end, the offensive his ways and an independent air force his means. Many airmen would cite his views later in heated debate for a separate air arm. MacIsaac, p. 635.

⁵⁶Alfred F. Hurley, Billy Mitchell, Crusader For Airpower (Bloomington, IN: Indiana University Press, 1975), p. 36.

⁵⁷Ibid.

⁵⁸Warner, p. 499.

⁵⁹Mitchell's military education included finishing as a 'Distinguished Graduate' in Fort Leavenworth's School of the Line and subsequent completion of the coveted second year course. He understood the theory and historical use of reserves in ground warfare. One example of this survives in Our Air Force where he describes a sneaky Japanese feint to force early commitment of Russian reserves in the 1904 Manchurian War.

Hurley, pp. 12, 39;

William A. Mitchell, Brig. Gen., Our Air Force, The Keystone of National Defense. New York: E.P. Ortton, 1971. pp. 22-23.

⁶⁰Mitchell, Our Air Force, The Keystone of National Defense, p. 22.

⁶¹He said: 'In the next place, the war, as it developed on the western front of Europe, was not so much a question of whipping the front line troops as it was a question of whipping the reserves, or making it impossible for them to arrive on the field of battle in sufficient time to have an influence on the battle.' Mitchell, Our Air Force, The Keystone of National Defense, p. 55.

⁶²Ibid., p. 62.

⁶³Hurley, p. 129;
Mitchell, Our Air Force, The Keystone of National Defense, pp. 34-36.

⁶⁴His concentration of airpower had won air superiority at St. Mihiel. He complemented the tank advance of George Patton in his Memoirs of WWI, saying: 'I am convinced that in the future the tank will be the only means of advancing on the ground against a well-intrenched and determined enemy.' He understood the horrors of ground warfare and tried to communicate their plight to his airmen: 'In all your work remember the arduous duties of the troops on the ground. When you

are freezing in the air, they are wading over the battlefields deep in mud and debris; when you are getting the enemy's tracer bullets and anti-aircraft fire through your planes, they are going through the artillery and machine gun fire below you. Their losses correspond to yours. You must protect them and show them the way forward. Work closely with them, because only by the combined work of all arms will our full power be developed."

MacIssac, p. 636;

Mitchell, Memoirs of World War I: From Start to Finish of Our Greatest War. (New York: Random House, 1960), pp. 275-277.

⁶⁶His later writings called this "facilitating the advance of the ground troops." Mitchell, Memoirs, pp. 235-236; Our Air Force, p. 42.

⁶⁶Mitchell, Our Air Force, p. 23.

⁶⁷Also: "Throughout the history of war, there has been a race between offensive and defensive weapons. Every major advance in offensive power has stimulated defensive thinking, and the other way around, so that the pendulum has swung from one extreme to the other. No sooner did a nation consider itself immune by reason of its defenses, than weapons and techniques for cutting through defenses emerged."

Alexander de Seversky, Victory Through Airpower, (New York: Simon and Schuster, 1942), p. 324;
---. America: Too Young To Die! (New York: McGraw, 1961), p. 187.

⁶⁸De Seversky, Victory Through Airpower, p. 324.

⁶⁹Ibid.

⁷⁰Tactical aviation, it should be realized, is no more than a weapon of ground force. A superior species of artillery. But artillery is useless unless followed up effectively by the surface forces for which it clears a path. [A] tactical air force is therefore meaningless without the necessary troops to exploit its action."

Alexander de Seversky, Airpower: Key to Survival. (New York: Simon and Schuster, 1950), p. xx.

⁷¹It is limited by weather while artillery is not. De Seversky, Airpower: Key To Survival, pp. cc-xxi.

⁷²De Seversky, America: Too Young to Die, p. 165.

⁷³Warden, pp. 165-166.

⁷⁴Ibid., p. 119.

⁷⁵Ibid., p. 120.

⁷⁶Bettering the odds coincided with Clausewitz's statement that reserves can help counter unforeseen threats. Reserves can help commanders exploit enemy weaknesses. They also can prevent an enemy exploitation of weaknesses. 'Air reserves are most needed when the enemy is equal or somewhat stronger than oneself.' Col. Warden re-emphasized the need for mass employment of the reserve at the proper time and place to capitalize on shock and surprise. Warden, pp. x, xi, 116, 124, 165-166.

⁷⁷Ibid., p. 126.

⁷⁸Ibid.

⁷⁹Constituting that reserve will appear to take some sorties away from air and ground commanders. This could cause consternation. Col. Warden comments: 'The beauty of an air reserve, controlled by the air component and theater commanders, is that it can be thrown in without taking anything away from anyone.' Warden, p. 127.

⁸⁰Warden, p. 127.

⁸¹Clausewitz offers four uses for historical examples; the explanation of an idea, the application of an idea, support of a statement, and deduction of a doctrine. His bottom line on using historical examples is stick to the truth.

Clausewitz, pp. 171, 174;
Robert D. Heinl, Dictionary of Military and Naval Quotations. (Annapolis, MD: US Naval Institute, 1966), p. 147.

⁸²Richard P. Hallion, Strike From the Sky. (Washington, D.C.: Smithsonian Institute Press, 1989), p. 259;

M. N. Kozhevnikov, The Command and Staff of the Soviet Army Air Force in the Great Patriotic War 1941-1945. Trans. and publs. under the auspices of the United States Air Force. (Washington, D.C.: 1986), p. 24.

⁸³The Second World War: Europe and the Mediterranean. Thomas E. Griess, Ed., (Wayne, NJ: Avery Publishing Group, 1984), p. 55.

**Bernard Brodie contended that the contest was a definite victory for the "defensive use of airpower" - a concentrated defensive system of fighters, ground observers, and radar. Since the Luftwaffe failed in bombing Britain to her knees, some could argue that "airpower alone cannot achieve a definite victory over an enemy." de Seversky argues convincingly against this view in Victory Through Airpower. Edward Luttwak relates a case in the pre-1967 Israeli Air Force where the offensive-minded fighter-bomber advocates and defensive-minded fighter interceptor advocates both argued their cases from the same lessons of the Battle of Britain.

Capelutti, pp. 205-206;

De Seversky, Victory Through Airpower, p. 70;

Edward N. Luttwak and Daniel Horowitz, The Israeli Army, 1948-1973. (New York: University Press of America, 1983), p. 121.

**The Encyclopedia of Air Warfare. Ed. by Iain Parsons. (New York: Thomas Y. Crowell Co. 1974), p. 85-86.

**Figure 2 shows the German objectives:

FIGURE 2
GERMAN OBJECTIVES

<u>ENDS</u>	<u>WAYS</u>	<u>MEANS</u>
Crack British will to resist and hope for a separate peace	1. Interdict Channel Shipping. 2. Destroy Radar and Fighter Command. 3. Bomb London	<u>Luftwaffe</u> attacks.

Sources: Encyclopedia of Air Warfare, pp. 85-87; J.F.C. Fuller, A Military History of the Western World. Volume III (New York: Funk & Wagnalls Company Inc., 1956), p. 410;

**Len Deighton, Fighter - The True Story of the Battle of Britain (New York: Knopf, 1978), p. xx.

**Encyclopedia of Air Warfare, p. 86.

**Luftwaffe Gen. Albert Kesselring commented: "It was clear to any discerning person, including Hitler, that England could not be brought to her knees by the Luftwaffe alone," if only because "The Luftwaffe could not deal with the British Fleet."

Len Deighton said in Fighter: "The decisive difference between the British and the Germans is that the British, directed by Dowding, knew what they were

doing and the Germans did not." Deighton, p. xviii; Greiss, p. 67; Fuller, pp. 410-411.

⁹⁰Deighton, p. 33.

⁹¹Ibid.

⁹²Ibid.

⁹³Deighton, p. 182; De Seversky, Victory Through Airpower, p. 62.

⁹⁴De Seversky, Victory Through Airpower, p. 62.

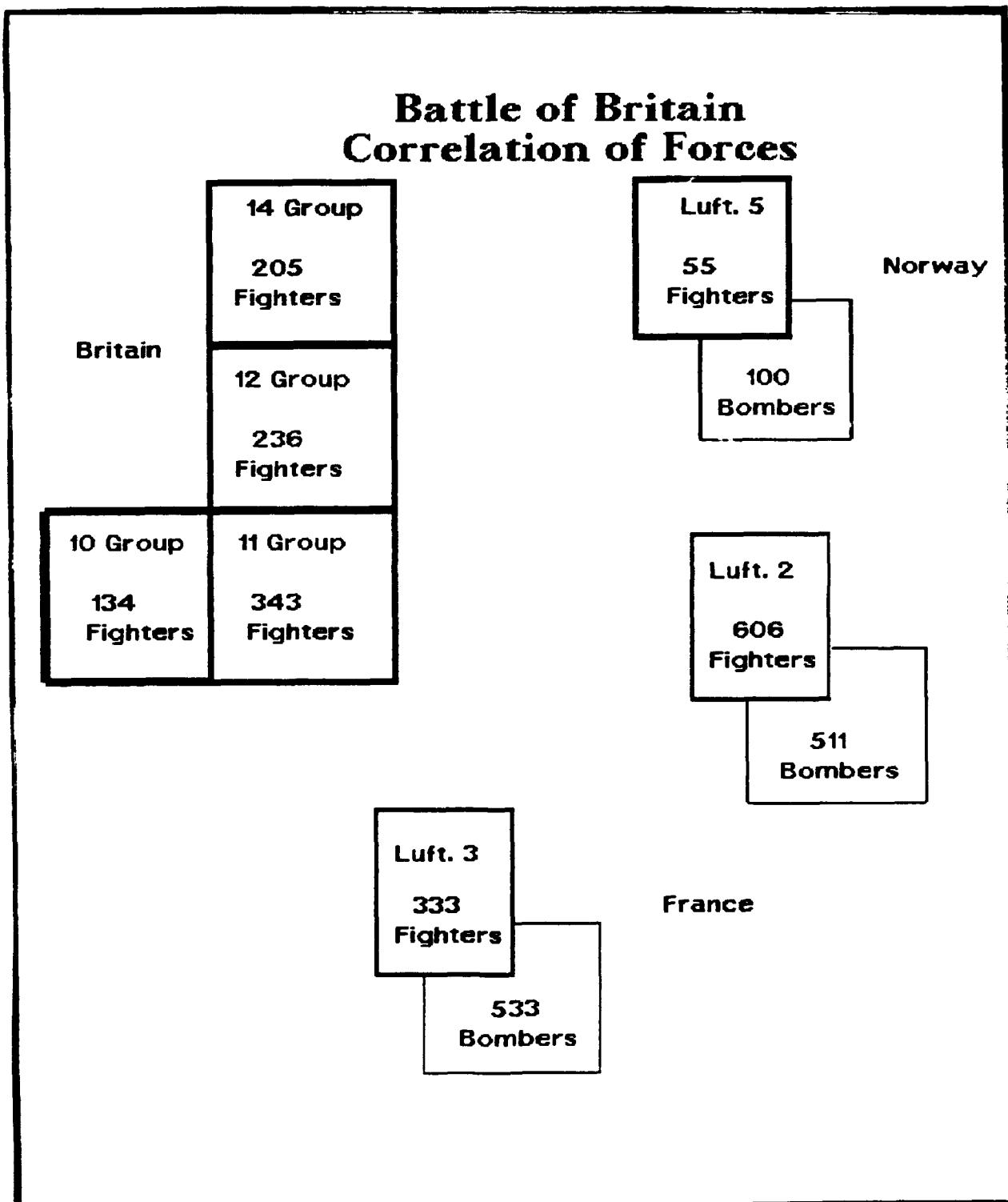
⁹⁵Dowding's 'single minded concentration on the defense of Great Britain' put him at odds with Prime Minister Winston Churchill during the Battle of France. Churchill wanted to send six additional fighter squadrons to the French (16 May 1940) after sending in four the previous day. This move would have put the RAF in a numerically inferior position (below the 52 squadrons the Air Ministry calculated for defense of Britain). Churchill's argument was political and Dowding's was military. The war cabinet compromised; six Hurricane squadrons flew tactical missions from French airfields during daylight hours. At night they returned to bases in England. After the fall of France, these aircraft and pilots were much appreciated in the Battle of Britain. Deighton, pp. 34, 49; Encyclopedia of Air Warfare, p. 86.

⁹⁶Kries, John F., Air Warfare and Air Base Defense, 1914-1973 (Washington, D.C.: Office of Air Force History, 1988), p. 79.

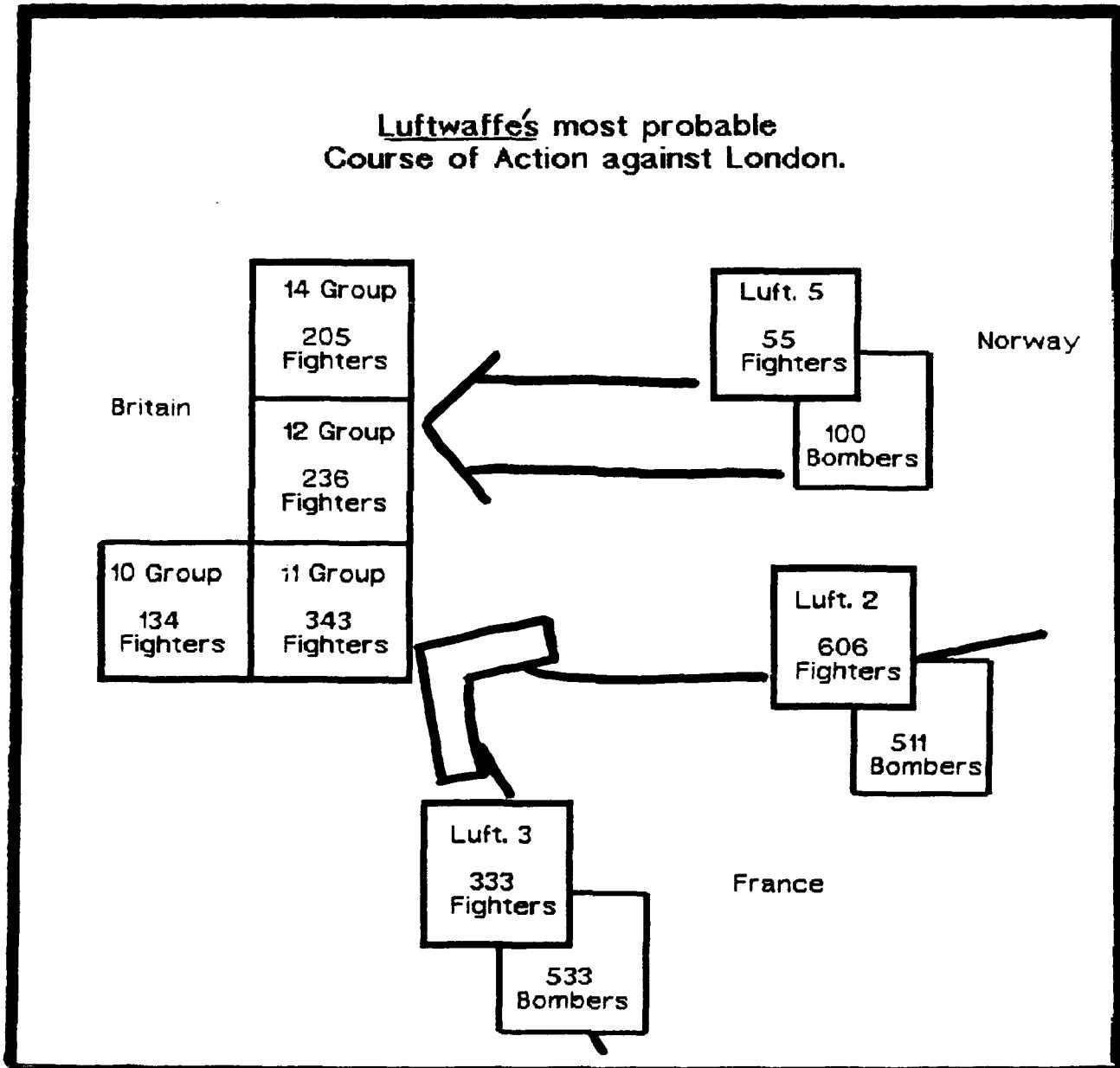
⁹⁷Encyclopedia of Air Warfare, p. 86.

⁹⁸Encyclopedia of Air Warfare, p. 86; Adolf Galland, The First and the Last: The Rise and Fall of the German Fighter Forces. Trans. from die Ersten und die Letzen by Mervyn Savill. (New York: Holt, 1954), p. 18; Griess, p. 60.

••I draw my analysis of options from Kreis, p. 79.
This is what the forces looked like:

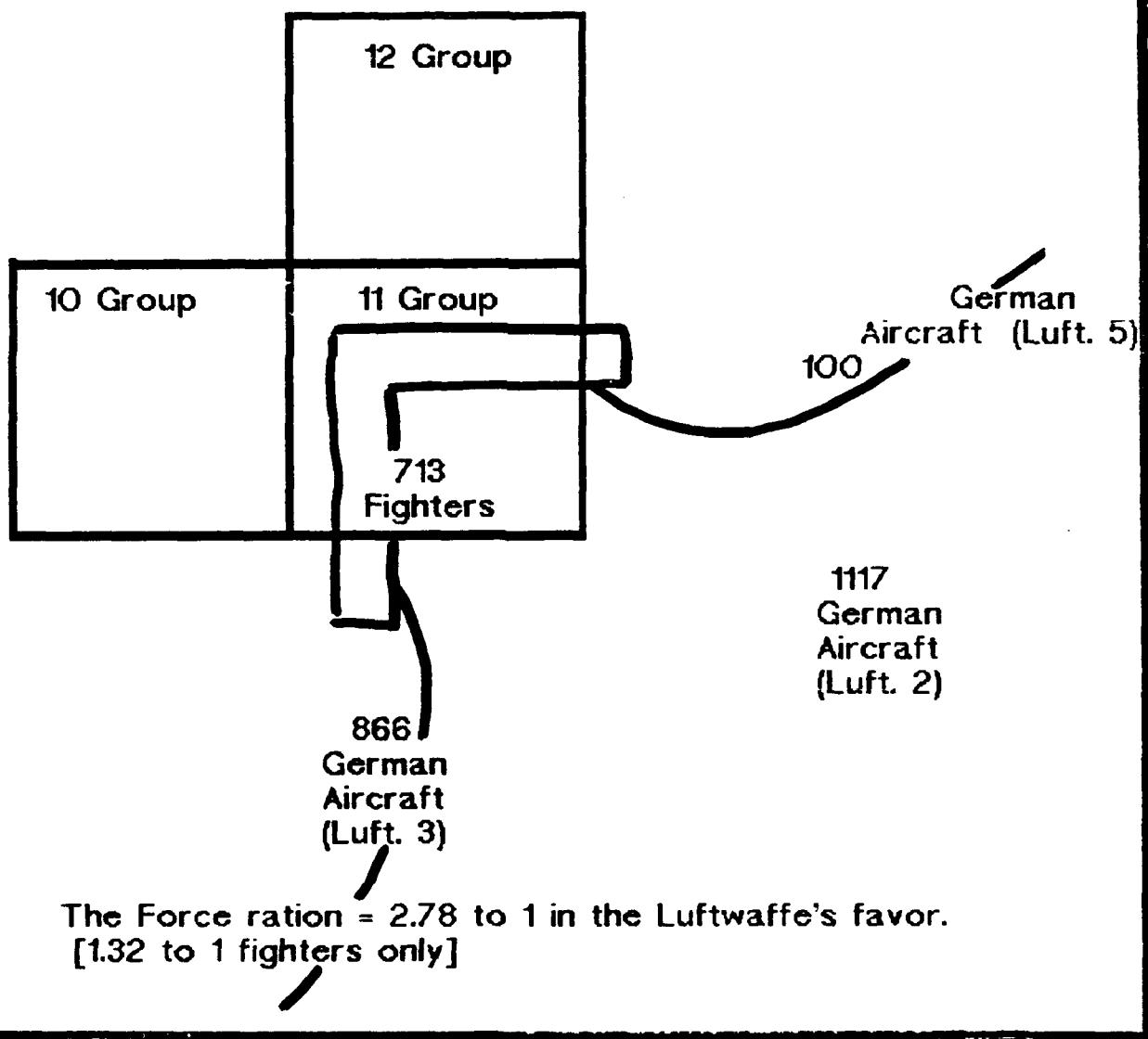


Given that, I believe the most probable Luftwaffe action would look like this:



I believe the worst case Luftwaffe course of action would be this:

Worst Case, Luftwaffe's Course of Action.



¹⁰⁰Ibid, p. 79.

¹⁰¹Griess, p. 62.

¹⁰²This type of reserve conforms to Jomini's unit in the line, ready for combat. Jomini, p. 147.

12 Group was supposed to be the reserve for 11 Group. Air Vice Marshal Leigh-Mallory, 12 Group Commander, was a strange bird. Air Marshal Dowding's strategy dictated that Leigh-Mallory protect his sector (12 Group) but also aid Park's 11 Group when needed. The job of protecting 12 Group's airfields while 12 Group engaged the Luftwaffe was not glamourous but it was necessary to the operational battle. Leigh-Mallory frequently ignored operational orders to get into the tactical fight with 'big wing' formations. He frequently criticized Dowding's and Parks' execution of the battle, but failed to do any better.

Deighton, pp. 220-221; Griess, p. 62; Jomini, p. 148; Bryan Philpot, RAF Fighter Units Europe, September 1934-1942. (New York: Sky Books Press, 1977), p. 24.

¹⁰³Encyclopedia of Air Warfare, p. 86.

¹⁰⁴Ibid.

¹⁰⁵Deighton, p. 20.

¹⁰⁶Ibid.

¹⁰⁷'C' squadrons fit Jomini's theory for reserves ready to make up for front line losses. Jomini, p. 148.

¹⁰⁸Cajus Bekker, The Luftwaffe War Diaries. (New York: Ballantine Books, October 1969), p. 240.

¹⁰⁹Kesselring said: ' We have no chance to destroying the English fighters on the ground. We must force their last reserve of Spitfires and Hurricane into combat in the air.' Bekker, p. 240.

¹¹⁰Kreis, p. 82.

¹¹¹Warden, p. 12.

¹¹²Encyclopedia of Air Warfare, p. 87.

¹¹³Deighton, pp. 131, 176, 183, 189, 190, 217, 221, 222, 229, 247; Warden, p. 122.

¹¹⁴Deighton, pp. 222, 235.

¹¹⁵Warden, p. 122.

¹¹⁶Bekker, p. 244.

¹¹⁷Bekker, pp. 244-245; Warden, p. 115.

¹¹⁸Deighton, p. 223.

¹¹⁹Encyclopedia of Air Warfare, p. 87.

¹²⁰Ibid.

¹²¹Deighton, p. 223.

¹²²It's ironic that Churchill had asked the French High Command the same question on 16 May 1940. A quote of Churchill survives today to note his feelings on reserves:

'It is in the use and withholding of their reserves that the great Commanders have generally excelled. After all, when once the last reserve has been thrown in, the Commander's part is played... The event must be left to pluck and to the fighting troops.' Heinl, p. 275; Warden, p. 115.

¹²³Fuller, p. 428.

¹²⁴Their theme was centralization: 'Military districts were organized into fronts and VVS (Air Force) commanders assigned to front staff. Aviation assigned to army and front commanders was no longer distributed among the combined arms commanders and employed in an uncoordinated fashion.' Kozhevnikov, p. vii.

¹²⁵Ibid., p. 76.

¹²⁶Ibid., pp. 75-76.

¹²⁷Ibid., p. 187.

¹²⁸Ibid., p. 2.

¹²⁹'The Stavka gave strategic direction' to the SAF. This direction included distributing Stavka air reserves among different fronts for specific operations. When Stavka air reserves joined a front, they 'freely entered the organizational structure of the air army of the front.' Likewise, they freely exited the structure on Stavka orders to detach. By Stalingrad, ten Stavka air reserve corps were formed in the SAF. [A Stavka air reserve corps ranged from 120-270 planes] Stavka air reserves served at the Leningrad and Volkhov fronts early in 1942. The need for continuous air cover over advancing ground forces led the SAF to employ Stavka air reserves in 'air offensives.' Kozhevnikov, pp. 69, 75-77, 93, 228.

¹³⁰Ibid., p. 108.

¹³¹Ibid.

¹³²Ibid., p. 107.

¹³³Ibid., p. 108.

¹³⁴Ibid., p. 110.

¹³⁵ SAF objectives for the Kuban air offensive were simple:

1. Achieve air supremacy.
2. Reliably cover the ground forces.
3. Support 56th Army's offensive and the beachhead defense of the Novorossiysk. [Koz:110]

German objectives were to "retain occupied positions at all costs and wipe out the beachhead defense at Novorossiysk."

Ibid., pp. 108-110.

¹³⁶Kreis, pp. 199.

¹³⁷Kozhevnikov, p. 115.

¹³⁸Ibid., pp. 111-114.

¹³⁹This was aerial attrition warfare. Kries:202

¹⁴⁰Ibid., p. 112.

¹⁴¹Ibid., p. 114.

¹⁴²Ibid.

¹⁴³Hermann Plocher, Generalleutnant, The German Air Force Versus Russia, 1941. (New York: Arno Press, 1968), p. 39.

¹⁴⁴Ibid., p. 43.

¹⁴⁵Kreis, p. 202.

¹⁴⁶Kozhevnikov, p. 108.

¹⁴⁷The next major test of the air offensive occurred at Kursk. The SAF gained the strategic initiative in the air in July 1943 at Kursk. Before the Kuban air offensive was completed, Kuban based Stavka air reserves transferred to the Kursk sector. The SAF

air offensive at Kursk followed the Kuban model.
Ibid., pp. 129, 135.

¹⁴⁸The air battles at Kursk lasted for almost two months with both sides suffering heavy losses. Winning air superiority at Kursk turned the tide of the air war. The Luftwaffe was on the strategic defensive after this on the Eastern Front. [For an idea of the scope of Stavka air reserves generated in WW II, see Kozhevnikov, pp. 244-248.] Kozhevnikov, pp. 142, 146-147, 152, 170, 182; Kreis, p. 199.

¹⁴⁹The Soviet 'air offensive' and the use of Stavka air reserves would both be excellent choices for future SAMS operational level monographs. Author.

¹⁵⁰DeSeversky, America: Too Young To Die. P. 114. Kenneth P. Werrell, Archie, Flak, AAA and SAM. (Maxwell AFB, AL: Air University Press, December 1988), p. 73.

¹⁵¹Encyclopedia of Air Warfare, pp. 166-169, 194, 210, 230-239.

¹⁵²In 1956 the Israelis used the French Air Force to cover their vital centers, which allowed the IAF freedom to provide CAS to their ground forces. British and French jets attacked the Egyptian Air Force.

Encyclopedia of Air Warfare, pp. 176-177, 225; Gunther E. Rothenberg, The Anatomy of the Israeli Army, (New York: Hippocrene Books, Inc., 1979), pp. 105.

¹⁵³Encyclopedia of Air Warfare, pp. 152-156.

¹⁵⁴Ibid., p. 153.

¹⁵⁵Ibid., p. 166-173.

¹⁵⁶Werrell, p. 81.

¹⁵⁷Roger P. Fox, Air Base Defense in the Republic of Vietnam, 1961-1973. (Washington, D.C.: Office of Air Force History, 1979), p. 27, 171, 173, 204.

Hallion, p. 269.

Werrell, p. 127.

Kreis, pp. 269, 271, 278, 296.

Werrell, p. 81, 102.

¹⁵⁸Richard A. Gabriel, Operation Peace for Galilee. (New York: Hill and Wang, 1984), pp. 19-20.

John F. Lehman, Jr., Command of the Seas. (New York: Charles Scribner's Sons, 1988), p. 310, 351.

Nadav Safran, Israel, The Embattled Ally. (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1978), p. 315.

Stanley M. Ulanoff, Fighter Pilot, (New York: Prentice Hall Press, 1986), p. 134; Werrell, pp. 146-147;

¹⁵⁹Ronald E. Berquist, The Role of Airpower in the Iran-Iraq War. (Maxwell AFB, AL: Air University Press, 1988), pp. 46-49, 75, 163;

Jeff Ethell and Alfred Price, Air War South Atlantic (New York: MacMillan Publishing Company, 1983), pp. 24, 67, 72, 98, 105, 214, 218-220, 222, 245, 253-254;

Telecon with Jeff Ethell, 5 March 1990.

Karsh, Efraim. The Iran-Iraq War: A Military Analysis (London: The International Institute for Strategic Studies, 1987), p. 20-31, 38.

Lehman, p. 277, 373;

Werrell, pp. 149, 166;

¹⁶⁰Berquist, pp. 5-6.

¹⁶¹Moshe Dayan stated in his diary that: 'the EAF must be destroyed on the ground for the Israeli invasion to succeed.' This 'first strike' mentality of the IAF was hammered into 'a detailed battle plan for the destruction of Egyptian and other Arab air forces at the beginning of any future war.' IAF pilots flew these rehearsal profiles in their normal routine training. Luttwak, pp. 196-197.

¹⁶²When the execution order came: 'This short, sharp war cost the Israelis a total of 40 to 50 aircraft (all but three to twelve to ground fire). In contrast, the Arab air forces lost about 450 aircraft, mostly on the ground, including 60-79 to Israeli aircraft and about 50 to Israeli ground based air defenses.' Luttwak, p. 221; Werrell, p. 138.

¹⁶³MacIsaac, p. 645.

¹⁶⁴Luttwak, pp. 198-199; Warden, p. 165.

¹⁶⁵The size of this reserve varies; depending on the source quoted, from 8 aircraft to one squadron in number.

Randolph S. Churchill and Winston S. Churchill. The Six Day War (Boston: Houghton Mifflin Company, 1967), p. 82.

Telecon with Edward Luttwak, 14 March 1990.

Edgar O'Ballance, The Third Arab-Israeli War. (Hamden, CT: Anchor Books, 1972), pp. 66.

Nadav Safran, From War to War (New York: Pegasus, 1969), pp. 324-325.

Warden, p. 165.

Ezer Weizman, Maj. Gen., IDF (Retd.) On Eagles' Wings (New York: Macmillan Publishing Co., Inc., 1976), p. 223.

¹⁶⁶Kreis, p. 332.

¹⁶⁷IAF operational level airstrikes struck at will deep into Egypt in 1970. This probably helped increase Russian aid and advice. The Russians soon manned Egyptian air defense sites and began flying MIG 21 interceptor missions soon afterwards. Luttwak, pp. 322-323.

¹⁶⁸Telecon with Edward Luttwak, 14 March 1990.

¹⁶⁹Berquist, p. 10.

¹⁷⁰Ibid., p. 44.

¹⁷¹Luttwak, pp. 302, 320-321.

¹⁷²Lt. Gen. Saad El Shazly, Chief of State Egyptian Armed Forces, ordered the EAF not to accept combat with the IAF at unfavorable odds. He reasoned that he could not afford to lose his air force by attrition to the superior skilled IAF and therefore directed his air units to decline combat. EAF airpower would provide cover only over Egyptian ground forces and maintain a defensive stance integrated into their IADS.

Berquist, p. 11.

Saad El Shazly, LTG. The Crossing of the Suez. (San Francisco, CA: American Mideast Research, 1980).

¹⁷³Moshe Dayan, Story of My Life (New York: William Morrow and Company, Inc., 1976), p. 508.

¹⁷⁴Dayan, p. 476; Safran, Israel: The Embattled Ally. p. 208.

¹⁷⁵Martin Van Creveld, Military Lessons of the Yom Kippur War: Historical Perspectives (Goergetown University: The Center for Strategic International Studies, 1975), pp. 12-13.

Safran, Israel: The Embattled Ally, p. 280.

¹⁷⁶ Some EAF Migs supported by Libyan Mirages supported an Egyptian attack in the Sinai Oct. 13 and 14 to aid a planned Egyptian ground advance to Gidi Pass. This attack failed and Israeli ground forces took the initiative in the Sinai. Safran, p. 304-306.

¹⁷⁷ Safran, Israel: The Embattled Ally, p. 309.

¹⁷⁸ Mets, David R., Land Based Airpower in Third World Crises. (Maxwell AFB, AL: Air University Press, 1986), p. 109.

Van Creveld, pp. 19-20.

¹⁷⁹ Van Creveld, pp. 30-31.

¹⁸⁰ Sources: Dayan, pp. 460-461; Chaim Herzog, The War of Atonement. (Boston: Little, Brown and Company, 1975), pp. 254-255. MacIsaac, pp. 645-646.

¹⁸¹ Herzog, p. 255.

¹⁸² Dayan, p. 461; Herzog, p. 256.

¹⁸³ Moshe Dayan, Israel's Minister of Defense, did not have operational authority to re-direct IAF operations from one front to another or give specific instructions on how to conduct operations. But he did influence IAF Chief General Peled to change his initial main effort from SEAD in the Sinai to stopping tanks in the Golan. Dayan, pp. 480-484; Herzog, pp. 256-259.

¹⁸⁴ Dayan, p. 484; Van Creveld, pp. 14-15.

¹⁸⁵ Hanoch Bartov, Dado: 48 Years and 20 Days (Israel: Ma'ariv Book Guild, 1981), p. 145; Werrell, p. 145.

¹⁸⁶ Bartov, pp. 367, 423, 429-30; Telecon with Edward Luttwak, 14 March 90.

¹⁸⁷ Dayan, pp. 480-484; Telecon with Edward Luttwak, 14 March 1990.

¹⁸⁸ Bartov, pp. 367-374.

¹⁸⁹ Bartov, p. 394; Telecon with Edward Luttwak, 14 March 90.

¹⁹⁰ In 1967 the Israeli air reserve could have committed if necessary against Egyptian, Syrian, or Iraqi bombers. In 1977 the Egyptian air reserve committed when the Israelis counterattacked across the Suez. Safran, Israel: The Embattled Ally, p. 309.

¹⁹¹Warden, pp. 20-24.

¹⁹²AFM 1-1, p. 2-2.

¹⁹³This begs the following logical questions: Under what conditions would an operational air commander commit the air reserves? Also, upon committment of the operational air reserve, how would the operational air commander employ it? Both are excellent future SAMS operational level monograph questions. Author.

¹⁹⁴All echelons of command and all Air Force members are responsible for critically evaluating existing doctrine, as well as recommending needed modifications and, when necessary, proposing new doctrine. Department of the Air Force, AFR 1-2.

Aerospace Doctrine Assignment of Responsibilities for Development of Aerospace Doctrine (Washington, D.C.: Headquarters United States Air Force, 25 July 1984), p. 2.

¹⁹⁵Joint Chiefs of Staff, JCS Pub 3-0 (Final Draft) Doctrine for Joint Operations (The Joint Chiefs of Staff, April 1989), p. C-3.

¹⁹⁶A review of AFM 1-1 shows no mention of air reserves. Air Force Manual 1-1, Basic Aerospace Doctrine of the United States Air Force (Washington, D.C.: Headquarters, United States Air Force, 16 March 1984)

¹⁹⁷A review of TACM 2-1 shows no mention of air reserves. Tactical Air Command, Tactical Air Command Manual 2-1 (Langley AFB, VA: Headquarters Tactical Air Command, 15 April 1978).

¹⁹⁸An unclassified review of MCM 3-1 Vol. 1 shows no mention of air reserves. Multi-Command Manual (MCM) / TACM / AACM / PACAFM / USAFEM 3-1, Volume (Vol.) 1, Mission Employment Tactics, Tactical Employment, General Planning and Employment Considerations, Secret (S). (Nellis AFB, NV: 57 FWW/DTW, 4 July 1989).

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